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HEMIDACTYLUS TANGANICUS, NEW SPECIES

FOR DESCRIPTION OF PLATE SEE PAGE 42

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UNITED STATES NATIONAL MUSEUM
BULLETIN 151

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NATIONAL MUSEUM

# EAST AFRICAN REPTILES AND AMPHIBIANS IN THE UNITED STATES NATIONAL MUSEUM

BY

ARTHUR LOVERIDGE

*Of the Museum of Comparative Zoölogy, Cambridge, Massachusetts*

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## ADVERTISEMENT

The scientific publications of the National Museum include two series, known, respectively, as *Proceedings* and *Bulletin*.

The *Proceedings*, begun in 1878, is intended primarily as a medium for the publication of original papers, based on the collections of the National Museum, that set forth newly acquired facts in biology, anthropology, and geology, with descriptions of new forms and revisions of limited groups. Copies of each paper, in pamphlet form, are distributed as published to libraries and scientific organizations and to specialists and others interested in the different subjects. The dates at which these separate papers are published are recorded in the table of contents of each of the volumes.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogues of type-specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

The present work forms No. 151, of the *Bulletin* series.

ALEXANDER WETMORE,
*Assistant Secretary, Smithsonian Institution.*

WASHINGTON, D. C., November 26, 1929.

## NOTE

During the years 1918 to 1924 the late Mr. N. Hollister published an account of the East African Mammals in the United States National Museum.[1] In writing this report on the reptiles and amphibians of the same region I have attempted, as far as circumstances would permit, to model it on the lines of Hollister's work. A few variations from the form of that paper have, however, been deemed advisable.

I should like to take this opportunity of expressing my thanks to Doctor Stejneger for settling several questions of generic priority or use and to Miss Cochran for information regarding specimens not forwarded to me; also my great indebtedness to Mr. H. W. Parker, who has taken much trouble in comparing certain specimens with the types in the British Museum and provided me with detailed notes on points of variability.

ARTHUR LOVERIDGE.

[1] Hollister, 1918, 1919, 1924, U. S. Nat. Mus. Bull. 99, Parts 1–3. Plates.

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# EAST AFRICAN REPTILES AND AMPHIBIANS IN THE UNITED STATES NATIONAL MUSEUM

By Arthur Loveridge

*Of the Museum of Comparative Zoölogy, Cambridge, Mass.*

## INTRODUCTION

Of papers dealing with the East African herpetological material in the National Collection only five have appeared. Three of these were by Dr. L. Stejneger[1] and references to them are given under each species to which he referred; two others by myself[2] appeared in 1928 and are not cited, nor is the material mentioned in these referred to again except in the complete List of Species (p. 8), where it so happens that the species is not mentioned in the body of this paper.

The geographical limits covered by this report differ slightly from those in Hollister's work, as no material from Somaliland is recorded and only one specimen from Abyssinia (now called Ethiopia) and two from the Sudan. The report is chiefly confined to specimens from Uganda, Kenya Colony, and Tanganyika Territory. In Hollister's work these last two regions appeared under their old names of British East Africa and German East Africa. In the present paper the abbreviations L. E. for Lado Enclave or West Nile Province of Uganda, U. for Uganda, K. C. for Kenya Colony, T. T. for Tanganyika Territory, have been used to avoid much useless repetition. Less than a dozen specimens from more or less adjacent territories have been included, namely, from Abyssinia, Belgian Congo, Mozambique, Rhodesia, and the Transvaal; in no instance, however, were they species not already known from East Africa as defined above.

Historically the earliest material from this region to reach the United States National Museum was Dr. W. L. Abbott's collections of 1888–89 and Mr. Astor Chanler's of 1892; both have been referred to in detail by Stejneger. The vast bulk of the collection, comprising some 2,000 specimens, was secured in 1909–10 by the Smithsonian African expedition under the direction of the late Col. Theodore Roosevelt. During 1911–12, when with the Frick and Paul J. Rainey

[1] Stejneger, 1891, Proc. U. S. Nat. Mus., vol. 14, pp. 353–4, fig.; pp. 405–6; 1893, vol. 16, pp. 711–741.
[2] Loveridge, 1928, Proc. U. S. Nat. Mus., vol. 72, art, 24, pp. 1–2; vol. 73, art. 17, pp. 1–69.

expeditions, Mearns and Heller again secured many interesting objects. More detailed accounts of these expeditions will be found in Hollister.[3] During 1919–20 H. C. Raven collected some material in the Transvaal, Rhodesia, and the Belgian Congo, besides larger series from Uganda. The whole of this material has been included, though coming from half a dozen localities extraterritoral to the true limits of this report.

To supply the deficiency of field notes I have followed Hollister's example in quoting from Col. Theodore Roosevelt's African Game Trails.[4] References to reptiles are, however, very scanty and relate almost entirely to such widely distributed and well-known forms as the nilotic crocodile, Nile monitor, spitting cobra, and puff adder.

The collection contains East African representatives of 1 species of crocodile, 7 of turtles, 59 of snakes, 52 of lizards, 10 of chameleons, and 30 kinds of toads and frogs. Though there are notable exceptions such as *Aparallactus christyi*, *Boulengerina stormsi*, *Philochortus intermedius*, *Eremias smithii*, *Bufo mocquardi*, and *Hyperolius symetricus*, the collection as a whole does not contain many rarities. A study of the very long series has, however, proved most valuable in adding to our knowledge of the ranges of variation of certain species. From the summary of taxonomic alterations it may be seen at a glance how useful this material has proved in adding to our understanding of the East African fauna.

## SUMMARY OF TAXONOMIC ALTERATIONS

The following species, or races, are described for the first time:

*Rhamnophis aethiopissa elgonensis*, new subspecies.
*Hemidactylus tanganicus*, new species.

while the undermentioned are revived:

*Agama agama caudospina* (Meek).
*Eremias spekii sextaeniata* (Stejneger).
*Rana aberdariensis* Angel.

As *Agama colonorum* Daudin becomes *Agama agama* (Linnaeus) the following are ranked as subspecies:

*A. agama lionotus* (Boulenger), formerly *A. lionotus* Boulenger.
*A. agama caudospina* (Meek), formerly *A. caudospina* Meek.
*A. agama elgonis* (Lönnberg), formerly *A. elgonis* Lönnberg.
*A. agama dodomae* (Loveridge), formerly *A. lionotus dodomae* Loveridge.
*A. agama mwanzae* (Loveridge), formerly *A. lionotus mwanzae* Loveridge.
*A. agama usambarae* (Barbour and Loveridge), formerly *A. colonorum usambarae* Barbour and Loveridge.

[3] Hollister, 1918, Bull. U. S. Nat. Mus., No. 99, p. 13, etc.
[4] Roosevelt, 1910, African Game Trails. New York and London.

The following are considered strict synonyms:

*Lycophidium jacksoni* Boulenger = *Lycophidion capense* (Smith).
*Psammophylax variabilis* Günther = *Trimerorhinus tritaeniatus* (Günther).
*Hemidactylus tornieri* Mocquard = *Hemidactylus werneri werneri* Tornier.
*Chamaesaura annectans* Boulenger = *Chamaesaura tenuior* Günther.
*Gerrhosaurus bergi* Werner = *Gerrhosaurus major* Duméril.
*Mabuia obsti* Werner = *Mabuya quinquetaeniata* (Lichtenstein).
*Mabuia q. hildebrandtii* Sternfeld = *Mabuya quinquetaeniata* (Lichtenstein).
*Chamaeleo angusticoronatus* Barbour = *Chamaleon dilepis dilepis* Leach.
*Chamaeleon b. bergeri* Sternfeld = *Chamaleon bitaeniatus höhnelii* (Steindachner).
*Chamaeleon affinis embuensis* = *Chamaleon fischeri excubitor* (Barbour).
*Hyperolius vittiger* Peters = *Megalixalus fulvovittatus* (Cope).
*Arthroleptis scheffleri* Nieden = *Arthroleptis minutus* Boulenger.
*Arthroleptis albifer* Ahl = *Arthroleptis minutus* Boulenger.
*Chiromantis macrops* Ahl = *Chiromantis petersi* Boulenger.
*Chiromantis albescens* Ahl = *Chiromantis petersi* Boulenger.
*Chiromantis fasciatus* Ahl = *Chiromantis petersi* Boulenger.
*Leptopelis nanus* Ahl = *Leptopelis bocagii* (Günther).

In addition to the new species the following should be added to the East African list:

*Kinixys erosa* (Schweigger) for Uganda.
*Hapsidophrys lineatus* Fischer for Kenya Colony.
*Aparallactus christyi* Boulenger for Kenya Colony.
*Echis carinatus* (Schneider) for Kenya Colony.
*Tarentola ephippiata* O'Shaughnessy for Uganda.
*Philochortus intermedius* Boulenger for Kenya Colony.
*Eremias spekii sextaeniata* Stejneger for Uganda.
*Chamaeleon senegalensis laevigatus* (Gray) for Kenya Colony.
*Chamaeleon gracilis gracilis* Hallowell for Kenya Colony.
*Megalixalus brachynemis* Boulenger for Tanganyika Territory.

In addition to those species now considered synonyms the undermentioned should be removed from the East African list:

Angel's record of *Elapops modestus* based on *Aparallactus concolor.*
Stejneger's record of *Latastia spinalis* based on *Philochortus intermedius.*
Stejneger's record of *Eremias brenneri* based on *Eremias smithii.*
Angel's record of *Bufo granti* based on *Bufo regularis regularis.*
Angel's record of *Rana aequiplicata* based on *Rana oxyrhynchus.*
Angel's record of *Rana fasciata* based on *Rana fasciata merumontana.*
Angel's record of *Arthroleptis schebeni* based on *Arthroleptis,* new species.

Possibly all records of *Agama planiceps* are referable to local subspecies of *Agama agama.*

Possibly all Kenya and most Tanganyika Territory records of *Rana nutti* should be referred to *Rana chapini* Noble, or the latter is a synonym of the former.

Possibly all records of *Hyperolius fulvovittatus* and its synonym *Hyperolius vittiger* for Tanganyika Territory should be referred to *Megalixalus brachynemis* Boulenger.

Other records that should be eliminated are:

My record of *Hemidactylus ruspolii* for Tanganyika Territory is based on *Hemidactylus tanganicus*, new species, plus juvenile *Hemidactylus brookii*.

My record of *Hemidactylus citernii* for Tanganyika Territory is based on very young examples of *Hemidactylus werneri*.

My record of *Agama flavicauda* Werner for Kenya Colony, unless it should prove idential with *Agama agama caudospina* (Meek), as I originally supposed.

*Mabuya homalocephala* based on a specimen of *Mabuya brevicollis* in Nairobi Museum.

In addition to the above a great many corrections of recorded identifications of various authors appear.

*Arthroleptis minutus* Boulenger should be added to the fauna of South Africa.

## LIST OF THE COLLECTING LOCALITIES IN EAST AFRICA [5]

*Aberdare Mountains—A range of mountains about halfway between Lake Naivasha and Mount Kenya. Summits said to be 11,000–12,000 feet.

*Athi Plains—North and east of Nairobi.

Budongo Forest—In the vicinity of Masinidi, northern Uganda.

*Changamwe—Station on the railroad 6 miles inland from Mombasa. Altitued 180 feet.

Dar es Salaam—Capital and principal port of Tanganyika Territory. Situated on the East Coast some 40 miles south of Zanzibar.

Dodoma—Station on the Central Railway of Tanganyika Territory about 260 miles from Dar es Salaam. Principal town of Ugogo. Altitude 3,890 feet.

Dussia—A little to the east of the southern end of Lake Rudolph, Kenya Colony.

*Fort Hall—About midway between Nairobi and Mount Kenya.

*Fort Hoima—See Hoima.

*Gondokoro—On the east bank of the Bahr el Jebel in extreme northwestern Uganda.

Guas Ngishu Plateau—See Uasin Gishu Plateau.

Guaso Nyiro River—See Northern and Southern Guaso Nyiro Rivers.

Gwao's—Village of Chief Gwao on the Itigi to Singida road about 40 miles north of Itigi a station on the Central Railway of Tanganyika Territory.

*Hoima—In Unyoro, western Uganda, not far from the eastern shore of Albert Nyanza.

Indunamara Mountains—These mountains are due east of Mount Nyiro and west of Mount Marsabit, Kenya Colony.

Itende—A village 10 miles south of Kideti, a station between Kilosa and Dodoma on the Central Railway of Tanganyika Territory.

Jombeni Range—Mountains to the northeast of Mount Kenya, but south of the Northern Guaso Nyiro.

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[5] In listing the collecting localities mentioned in this paper I find that nearly one-third are already recorded by Hollister. I have taken the liberty of quoting his definitions verbatim, or almost verbatim, but have indicated such by an asterisk to distinguish them from those which I have personally defined. I have followed Hollister's spelling throughout except in the words Kenia and Ulukenia, now universally rendered Kenya and Ulukenya; also Uasin Gishu is used in place of the Guas Ngishu of Hollister. Though I have followed him in giving preference to the name Lukosa River for Yala River, I rather think the latter name is more generally known and used.

*Juja Farm—The late W. N. McMillan's place on the Athi Plains, about 23 miles northeast of Nairobi.

*Kabula Muliro—On the road about midway between Kampala and Hoima, Uganda, between Albert Nyanza and Victoria Nyanza.

*Kaimosi—On the Lukosa River just north of the Equator and north of Port Florence (Kisumu) the western terminus of the railway in Kavirondo.

*Kakumega—Just north of the Equator near Port Florence (Kisumu), the western terminus of the railway in Kavirondo, Kisumu Province, northeast of Victoria Nyanza.

*Kampala—Fort Kampala, or Mengo, just north of Entebbe, Uganda, and near the northwestern edge of Victoria Nyanza.

*Kapiti Plains—A station, also called Kapiti, or Kapiti Station, on the railway 29 miles southeast of Nairobi and 288 miles from Mombasa. Altitude 5,350 feet.

*Kasorongai River—On the west side of Mount Kenya and north of Nyeri.

Kianuna—Between Entebbe and Kabula Muliro, Uganda.

Kibosho—At the foot of Mount Kilimanjaro.

Kibwezi—A station on the Uganda Railway between Mtoto Andei and Makindu, Kenya Colony. Altitude 2,985 feet.

Kidonda—There are two places of this name in northern Uganda; one, E. 31.5°, N. 1.3°; the other, E. 31.1°, N. 1.3°.

Kigoma—Ten miles north of Ujiji, on the northwestern shores of Lake Tanganyika. It is the terminus of the Central Railway. Altitude 2,540 feet.

Kilimanjaro—See Mount Kilimanjaro.

Kilosa—Situated on the Central Railway of Tanganyika Territory, 177 miles west of Dar es Salaam. Altitude 1,606 feet.

*Kisumu—A town on Ugowe Bay, northeastern shores of Victoria Nyanza and near Port Florence. Also a province of western Kenya Colony bordering on Victoria Nyanza.

*Kitanga—Sir Alfred Pease's farm in the Mwa Hills on the Athi Plains, near Nairobi and Athi Station.

Kongwa—A village northeast of Dodoma and west of Mpwapwa in the Dodoma district of the Central Province of Tanganyika Territory.

Lake Hannington—In the eastern rift valley just south of the Equator, below Laikipia Escarpment.

*Lake Naivasha—A lake and station on the railway across Kenya Colony, 391 miles from Mombasa and almost 200 miles from Port Florence. Altitude of the station 6,230 feet.

Lake Rudolph—In northwestern Kenya Colony bisected by 4° latitude and 32° longitude.

Lake Tanganyika—At the southern end of the great central rift valley. It covers an area of 12,700 square miles and is the longest fresh-water lake in the world. Depth 2,000 feet. Altitude 2,600 feet.

Lake Victoria—See Victoria Nyanza.

Lamu Island—Principal island of the Lamu Archipelago between 2° 20′ and 2° 5′. Opposite Lamu on the coast of Kenya Colony.

Lukenya or Lukenia—See Ulukenya.

*Lukosa River—South of the Nzoia River on the Uasin Gishu Plateau, flowing into Victoria Nyanza. Also called Luko River and Yala River.

*Maji-Ya Chumvi—A station on the railroad 35 miles from Mombasa. Altitude 570 feet.

Malele—Southeast of the southern end of Lake Rudolph, Kenya Colony.

*Mariakani—A station on the railroad 26 miles from Mombasa. Altitude 677 feet.

*Marsabit Road—The road leading to Mount Marsabit, north of the Northern Guaso Nyiro River.

Masindi—North of Hoima, Uganda, and west of Lake Kioga.

*Mazeras—A station on the railroad 16 miles from Mombasa. Altitude 535 feet.

Mbala—A village about 50 miles south of Kilosa on the Kilosa-Iringa Road, Tanganyika Territory.

Mbunyi—A station on the Voi-Taveta line, Kenya Colony, but southwest of Mount Kilimanjaro.

*Merelle River, or Merelle Water—On the Marsabit Road, about midway between the Northern Guaso Nyiro River and Mount Marsabit.

*Meru—Just north of Mount Kenya.

*Mnyouri Jardin—On the east bank of the Bahr el Jebel, between Gondokoro and Nimule, and just south of Ledgus, northwestern Uganda.

Mombasa—Principal port of entry to Kenya Colony, on the east coast north of Pemba Island. Altitude 70 feet.

Morogoro—A station on the Central Railway of Tanganyika Territory, 126 miles west of Dar es Salaam. Principal town of the Ukami country. Altitude 1,628 feet.

*Mount Gargues—In the Mathews Range, north of Mount Kenya and southeast of Lake Rudolph. Summit said to be 8,800 feet altitude. Also written Mount Uaragess.

*Mount Kenya—Highest mountain of Kenya Colony and situated almost directly upon the Equator. Altitude 17,000 feet; timber line about 13,000 feet.

*Mount Kilimanjaro—Highest mountain of Tanganyika Territory, situated on the border of that Territory and Kenya Colony about 175 miles from the coast. Altitude 19,780 feet.

*Mount Lololokwi—An isolated mountain east of the Mathews Range, about midway between Mount Kenya and Mount Marsabit, Kenya Colony.

Mount Longido—To the northwest of Mount Kilimanjaro. Specimens were collected in the vicinity of the British camp at the western foot of the mountain.

*Mount Mbololo—In the Taita Hills about midway between Mount Kilimanjaro and the coast. Summit 4,400 feet. Sometimes written Mbululu.

Mount Nyero—Close to the southern end of Lake Rudolph, Kenya Colony.

*Mount Sagalla—In the southern Taita Hills, about midway in a line between Mount Kilimanjaro and Mombasa.

*Mount Uaragess—See Mount Gargues.

*Mtoto Andei—A station on the Uganda Railway 165 miles inland from Mombasa. Altitude 2,419 feet.

Mukwese—About 10 miles north of Manyoni station to the west of Dodoma on the Central Railway of Tanganyika Territory.

Nabea—At edge of the Budongo forest, about 15 miles west of Masindi.

*Nairobi—Capital of Kenya Colony, on the railway 327 miles from Mombasa and 260 miles from Port Florence. Altitude 5,452 feet.

Nile Camp—See Rhino Camp.

*Nimule—On the east bank of the Bahr el Jebel, about midway between Albert Nyanza and the Sudan border, in northwestern Uganda.

*Njoro Osolali, or Njoro o Solali—In the Sotik, southwestern Kenya Colony.

*Northern Guaso Nyiro—The region drained by the Northern Guaso Nyiro River, north of Mount Kenya.

*Northern Guaso Nyiro River—Formed by numerous streams in the Aberdares, northern slopes of Mount Kenya and Mathews Range, and flowing eastward at least to the Lorian Swamp.

Nyambita—A village about 50 miles southeast of Mwanza on the southeast shores of Victoria Nyanza, Tanganyika Territory.

*Nyeri—On the southwestern side of Mount Kenya. Altitude 5,874 feet.

Pease's Farm—See Kitanga.

*Rhino Camp—Colonel Roosevelt's base camp on the west bank of the Nile in extreme southern Lado Enclave (now West Nile Province of Uganda), at 2° 55′ north.

*Sir Alfred Pease's Farm—See Kitanga.

*Sirgoit Lake—Near the Elgeyo Escarpment, eastern edge of the Uasin Gishu Plateau, northwest from Sirgoit, Kenya Colony.

*Southern Guaso Nyiro—Region of the Southern Guaso Nyiro River, southwestern Kenya Colony.

Sururu Village—In the West Nile Province of Uganda.

*Tana River—Heads in the Aberdares and southern side of Mount Kenya and flows into the Indian Ocean something over 100 miles north of Mombasa.

*Uasin Gishu Plateau—South and east of Mount Elgon, west of the Elgeyo Escarpment, and north of the Nandi Hills. Drained by the upper waters of the Nzoia River.

Ujiji—An ancient Arab settlement to the south of Kigoma on the east shore of Lake Tanganyika.

Ukami—The country of the Wakami Tribe, roughly about 120 miles west of Dar es Salaam, Tanganyika Territory. The Uluguru Mountains are the headquarters of the tribe. See also Morogoro.

*Ulukenya Hills—On the Athi Plains east of Nairobi. Also written Ulukenia, Alucania, Ulucania, Lukenya, etc.

Uma-Khor—Presumably between the Uma and Khor Rivers in the West Nile Province of Northern Uganda.

Victoria Nyanza—The largest fresh-water lake in Africa. Lies between 0° 20′ N. to 3° S. and 31° 40′ to 34° 52′ E. Covers an area of 26,000 miles. Altitude about 2,000 feet.

*Voi—A station on the Uganda Railway 103 miles northwest from Mombasa. Altitude 1,834 feet.

Wadelai—Just north of Lake Albert Nyanza in Uganda protectorate.

*Wambugu—Between Fort Hall and Mount Kenya at 5,300 feet altitude.

Wange—A village on Manda Island, slightly north of Lamu on the east coast of Kenya Colony.

Wiji River—Probably near the Southern Guaso Njioro River, Kenya Colony.

Yala River—See Lukosa River.

## EXTRALIMITAL LOCALITIES ALSO MENTIONED

Abyssinia (=Ethiopia):

Bodessa—South of Gardulla near the Saigon River.

Gato River—At a point near Gardulla in southwestern Abyssinia and to the northeast of Lake Rudolph.

Belgian Congo:

Albertville—A town to the west of Lake Tanganyika.

Elizabethville—In south central Belgian Congo.

Lualaba River—At a point near Albertville.

Portuguese East Africa:

Lumbo—On the mainland 3 miles across the bay from Mozambique Island.

Rhodesia:

Kafue River—Just south of Broken Hill, crossed by the railway connecting Elizabethville with the Victoria Falls.

Victoria Falls—On the Zambezi River at Livingstone.

SUDAN:

REJAF—On the west bank of the Nile just south of Gondokoro and north of Wadelai, Uganda.

TRANSVAAL:

MALMAMI OOG—A farm near the headwaters of the Malmami River, about 10 miles from Ottoshoop, between Zeerust and Mafeking.

OTTOS HOOP—A few miles north of Mafeking and close to the Bechuanaland-Transvaal border.

## LIST OF SPECIES IN THE NATIONAL COLLECTION


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  - Family Testudinidae—
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[6] In the collection, referred to in my 1928 paper but not discussed in the present one.

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[6] In the collection, referred to in my 1928 paper but not discussed in the present one.

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[6] In the collection, referred to in my 1923 paper but not discussed in the present one.

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# Class REPTILIA

## Order LORICATA

### Family CROCODYLIDAE

#### Genus CROCODYLUS Laurenti

##### CROCODYLUS NILOTICUS Laurenti

*Crocodylus niloticus* Laurenti, 1768, Syn. Rept. p. 53. part. (Type locality, "Habitat in India orientali, et Aegypto.")

*Crocodilus niloticus* Boulenger, 1889, Cat. Chelon. Brit. Mus., p. 283.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 713.

1 (U.S.N.M. 20071) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 42149–50) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 63592) Nairobi, K. C. (Raven) 1920.

The Tana River specimen was taken between Hemeye and the coast. No. 42150 consists of only the bones of the leg.

He [Kermit] also shot a 12-foot crocodile. The ugly, formidable brute had in its belly sticks, stones, the claws of a cheetah, the hoofs of an impalla, and the big bones of an eland, together with the shell plates of one of the large river turtles; evidently it took toll indifferently from among its fellow denizens of the river and from among the creatures that came to drink, whether beasts of pasture or the flesh eaters that preyed upon them. (Roosevelt, writing from the Guaso Nyiro, pp. 286–287.)

After leaving this camp we journeyed up the Guaso Nyero for several days. The current was rapid and muddy and there were beds of reeds and of the tall, graceful papyrus. * * * Whenever on our hunts we had to cross it, we shouted and splashed and even fired shots, to scare the crocodiles. I shot one on a sandbar in the river. (Roosevelt, p. 311.)

Kermit also killed a monitor lizard, and a crocodile 10 feet long; it was a female, and contained 52 eggs, which, when scrambled, we ate and found good. (Roosevelt, writing from the Lado Enclave, p. 417.)

At the foot of a steep bluff, several yards from the water, a crocodile lay. I broke its neck with a soft-nosed bullet from the little Springfield, for the plated skin of a crocodile offers no resistance to a modern rifle. We dragged the ugly man-eater up the bank and sent one of the porters back to camp to bring out enough men to carry the brute in bodily. It was a female containing 30 eggs. We did not find any crocodile's nest, but near camp, in digging a hole for the disposal of refuse, we came on a clutch of a dozen eggs of the monitor lizard. (Roosevelt, writing from the Lado Enclave, p. 418.)

In a shallow bay we came upon two hippo cows with their calves and a dozen crocodiles. I shot one of the latter—as I always do, when I get a chance—and it turned over and over, lashing with its tail as it sank. (Roosevelt, writing from the Lado Enclave, p. 433.)

Kermit also shot a 12-foot crocodile in which he found the remains of a heron. (Roosevelt, writing from the Lado Enclave, p. 434.)

# Order TESTUDINATA

## Family TESTUDINIDAE

### Genus TESTUDO Linnaeus

#### TESTUDO PARDALIS Bell

*Testudo pardalis* Bell 1928, Zool. Journ., vol. 3, p. 420 ("Africa?").—Boulenger, 1889, Cat. Chelon. Brit. Mus., p. 160.

1 (U.S.N.M. 41685) Southern Guaso Nyiro River, K. C. (Sm. Afr. Exped.), 1910.
8 (U.S.N.M. 48944–51) Mtoto Andei Station, K. C. (Heller), 1911.
1 (U.S.N.M. 49222) Kaimosi, K. C. (Heller), 1911.

The long series from Mtoto Andei are not all alcoholics, most of the specimens being either stuffed "skins" or shells with bones.

### Genus KINIXYS Bell

#### KINIXYS EROSA (Schweigger)

*Testudo erosa* Schweigger, 1814, Prodr. Monogr. Chelon., p. 52 (Habitat?).
*Cinixys erosa* Boulenger, 1889, Cat. Chelon. Brit. Mus., p. 141.

1 (U.S.N.M. 63484) Nabea, U. (Raven) 1920.

This specimen consists of a shell with head and feet preserved. I have examined these and confirm Miss Cochran's identification. It constitutes the first record of the occurrence of this tortoise in Uganda. Greatest length, 282 mm.; greatest width (behind hinge), 190 mm.; greatest depth, 108 mm. All shell measurements.

#### KINIXYS BELLIANA Gray

*Kinixys belliana* Gray, 1831, Synopsis Rept., p. 69 (Habitat ?).
*Cinixys belliana* Boulenger, 1889, Cat. Chelon. Brit. Mus., p. 143.

3 (U.S.N.M. 40249–51) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41699) Kenya Colony (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 48952) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 49426) Maji ya Chumvi, K. C. (Heller) 1911.
1 (U.S.N.M. 50658) East Africa (?) (Heller) 1911.
1 (U.S.N.M. 63482) Masindi, U. (Raven) 1920.

I have not examined these specimens, but the localities are all within the range of the species and there is nothing else with which they could possibly be confused. No. 49426 is fragmentary and No. 48952 a "skin"; the rest are presumably alcoholics.

## Family PELOMEDUSIDAE

### Genus PELUSIOS Wagler

#### PELUSIOS SINUATUS (Smith)

*Sternothaerus sinuatus* Smith, 1838, Illustr. Zool. S. Africa, Rept., vol. 3, pl. 1 (South Africa "in rivers to the north of 25° S. latitude).—Boulenger, 1889, Cat. Chelon. Brit. Mus., p. 194.—Siebenrock, 1909, Zool. Jahrb. supp. 10, pt. 3, p. 556.

1 (U.S.N.M. 40253) Juja Farm, K. C. (Mearns) 1909.
2 (U.S.N.M. 63379–80) Ujiji, T. T. (Raven) 1920.

I have not the slightest doubt that these tortoises have been correctly identified with *sinuatus;* they agree in every respect with Siebenrock's revised description. The mesial notch and lateral cusps of the beak are certainly not obvious, but these characters—on which Boulenger partly based his key to the species—are probably not of specific importance, as has been suggested by various writers. I hesitate to refer them to Hewitt's *P. s. zuluensis,* though they agree with that race in the pronounced protuberances of the third and fourth vertebræ; they disagree in that their ventrals are broader than long (as in *sinuatus* typica), but Hewitt's type series shows great variation in his particular character and I attach no importance to such variations. Siebenrock has already placed Boulenger's *S. bottegi* from Zululand in the synonymy of *sinuatus* and the holotype of *bottegi* was distinguished by very elongated vertebrals and by the absence of the mesial notch and lateral cusps to which I have already referred. Turtles and tortoises appear to be subject to a very wide variation, and large series alone will help us to define the range and limits of variation in this and allied forms. The young of *sinuatus* and *nigricans castaneus* are very distinct, the former having the posterior marginals with pronounced indentations so that the carapace presents a sawlike or toothed edge posteriorly. The many score of *castaneus* which I have handled have the sutures of the plastral scutes black, sometimes only the center of the scutes showing any light color; in *sinuatus,* however, the whole of the center of the plastron is light (orange or yellow in life), only its outer edges being margined with black. Whether this is the case with full-grown specimens I am unable to say. The above series are all young, their dimensions being as follows:

| | Length | Width | Depth |
|---|---|---|---|
| | *Millimeters* | *Millimeters* | *Millimeters* |
| U.S.N.M. 40253 | 104 | 84 | 37 |
| U.S.N.M. 63380 | 82 | 63 | 33 |
| U.S.N.M. 63379 | 61 | 54 | 23 |

### Genus PELOMEDUSA Wagler

#### PELOMEDUSA GALEATA (Schoepff)

*Testudo galeata* Schoepff, 1792, Hist. Testud., p. 12, pl. 3, fig. 1. ("Habitat in India orientale, Carolina.").—Boulenger, 1889, Cat. Chelon., p. 194.—Siebenrock, 1909, Zool. Jahrb., supp. 10, pt. 3, p. 561.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 411, pl. 11, fig. 3; text fig. 1.

1 (U.S.N.M. 40248) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40252) Sotik, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 48593) Uganda (Heller) 1911.

This, the commonest of African fresh-water turtles in the eastern part of the continent, is distinguished from all the others by the absence of any plastral hinge.

## Order SQUAMATA

## Suborder OPHIDIA

## Family TYPHLOPIDAE

### Genus TYPHLOPS Schneider

#### TYPHLOPS MANDENSIS Stejneger

*Typhlops mandensis* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 725.—Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 587.—Loveridge, 1923, Proc. Zool. Soc. London, p. 872.

Type (U.S.N.M. 20125) Wange, Manda Id., K. C. (Denhardt) 1892.

The type of this interesting reptile remains unique except for a second specimen which I collected at Morogoro, Tanganyika Territory, in 1917.

#### TYPHLOPS PUNCTATUS PUNCTATUS (Leach)

*Acontias punctatus* Leach, 1919, in Bowdich, Miss. Ashantee, p. 493.
*Typhlops punctatus* (part) Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 42.
*Typhlops punctatus punctatus* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 106.

1 (U.S.N.M. 40898) Juja Farm, K. C. (Loring) 1909.

This example is referable to *punctatus* in its restricted sense; it possesses 28 scale rows at mid-body and there is a brown spot on each light yellowish scale resulting in a lineolate appearance. Length 320 (315 + 5) mm.

#### TYPHLOPS SCHLEGELII Bianconi

*Typhlops schlegelii* Bianconi, 1850, Spec. Zool. Mosamb., p. 13, pl. 3, fig. 2.—Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 44.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 725.

2 (U.S.N.M. 20123–4) Wange, Manda Id., K. C. (Denhardt) 1892.

These specimens agree with Bianconi's figure of the type from Mozambique in that the praeocular is in contact with the second

upper labial only. Boulenger, however, writes that the praeocular is in contact with the second and third upper labials; this is the case with the only specimen available for comparison, a specimen (M. C. Z. 18169) of somewhat uncertain data, being found in a bottle at Morogoro, Tanganyika Territory, after the capture of the town in 1916. As the other material all occurred locally it is probable that it also came from the vicinity of Morogoro. Both island snakes have 34 scale rows, the Morogoro snake 36, both differing from the usual range of 38 to 44 scale rows. It would be interesting to know if those with 38 scale rows are not really *T. mucruso varius*, for snakes of the latter color race with 38 scale rows have been received at the Museum of Comparative Zoölogy as *T. schlegelii* on more than one occasion.

TYPHLOPS MUCRUSO (Peters)

*Onychocephalus mucruso* PETERS, 1854, Monatsber. Akad. Wiss. Berlin, p. 621 (Tette, Macanga).

*Typhlops mucruso* BOULENGER, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 46.

The various color forms such as *varius* and *humbo* do not appear to be worthy of recognition as the scale characters on which they were based are now known to be common to *mucruso* forma *typica*, nor are they confined to any definite geographical area.

3 (U.S.N.M. 62891–3) Morogoro, T. T. (Loveridge) 1916–17.
1 (U.S.N.M. 63536) Kafue River, Rhodesia. (Raven) 1919.

The three Morogoro snakes agree in having the nasals barely in contact behind the rostral while they are well separated in the Rhodesian reptile. The eye is beneath the suture between praeocular and ocular in the Rhodesian and in two of the Tanganyika snakes while it is beneath the ocular in No. 62891. No specific importance can be attached to these variations. The Morogoro snakes have 30 mid-body scale rows while the Kafue River specimen has 34. Diameter is included in the length 22 to 34 (Morogoro) and 30 (Kafue River) times. All within the range of variation recognized by Boulenger. Total lengths 135 to 335 mm.

TYPHLOPS LUMBRICIFORMIS (Peters)

*Onychocephalus* (*Lethcobia*) *lumbriciformis* PETERS, 1874, Monatsber. Akad. Wiss. Berlin, p. 277 (Zanzibar Coast).

*Typhlops lumbriciformis* BOULENGER, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 54.

1 (U.S.N.M. 43097) Changamwe, nr. Mombasa, K. C. (Mearns) 1909.

Unfortunately this specimen is rather dried, making it difficult to ascertain its length and diameter with accuracy. I have previously examined an example of this rare snake from Mombasa.

#### TYPHLOPS UNITAENIATUS (Peters)

*Typhlops (Letheobia) unitaeniatus* Peters, 1878, Monatsber. Akad. Wiss. Berlin, p. 205, pl. 2, fig. 5 (Taita, Kenya Colony).
*Typhlops unitaematus* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 54.

1 (U.S.N.M. 22091) Jombéni Range, K. C. (Chanler) 1892.

This typically colored specimen in a beautiful state of preservation has 22 instead of 24 midbody scale rows. Total length 280 mm. Diameter 5 mm. is included fifty-six times in the length. A specimen from Kibwezi, K. C., in the collection of the Museum of Comparative Zoölogy measures 380 mm., but shows no increase in diameter, the latter being 76 times in the length.

## Family LEPTOTYPHLOPIDAE

### Genus LEPTOTYPHLOPS Fitzinger

#### LEPTOTYPHLOPS DISTANTI (Boulenger)

*Glauconia distanti* Boulenger, 1892, in Distant's A Naturalist in the Transvaal, p. 175, fig.; 1893, Cat. Snakes Brit. Mus., vol. 1, p. 62.—Loveridge, 1923, Proc. Zool. Soc. London, p. 874.

3 (U.S.N.M. 42188, 49661–2) East Africa (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 62894–5) Morogoro, T. T. (Loveridge) 1916–17.
2 (U.S.N.M. 62896–7) Mt. Longido, T. T. (Loveridge) 1916.

The diameter is included in the length from 37 to 56 times as against 48 to 65 times as recognized hitherto.

## Family BOIDAE

### Genus PYTHON Daudin

#### PYTHON SEBAE (Gmelin)

*Coluber sebae* Gmelin, 1788, Syst. Nat., vol. 1, p. 1118.
*Python* Roosevelt, 1910, African Game Trails, pp. 113, 157.
*Python sebae* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 86.

1 (U.S.N.M.40246) Pease's Farm, K. C. (Sm. Afr. Exped.) 1909.

When, after arranging for this impalla to be carried back to the farm, we returned to where our horses had been left, the boys told us with much excitement that there was a large snake near by; and sure enough a few yards off, coiled up in the long grass under a small tree, was a python. I could not see it distinctly, and using a solid bullet I just missed the backbone, the bullet going through the body about its middle. Immediately the snake lashed at me with open jaws, and then uncoiling, came gliding rapidly in our direction. I do not think it was charging; I think it was merely trying to escape. But Judd, who was utterly unmoved by lion, leopard, or rhino, evidently held this snake in respect, and yelled to me to get out of the way. Accordingly, I jumped back a few feet, and the snake came over the ground where I had stood; its evil genius then made it halt for a moment and raise its head to a height of perhaps 3 feet, and I killed it by a shot through the neck. The porters were much wrought up about the snake, and did not at all like my touching it and taking it up, first

by the tail and then by the head. It was only 12 feet long. We tied it to a long stick and sent it in by two porters. (Roosevelt, pp. 113–114.)

I killed a 9-foot python which had swallowed a rabbit. (Roosevelt, p. 157.)

## Family COLUBRIDAE

### Genus NATRIX Laurenti

#### NATRIX OLIVACEA (Peters)

*Coronella olivacea* Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 622 (Tette, Mozambique).

*Tropidonotus olivaceus* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 227.

*Natrix olivacea* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 109.

1 (U.S.N.M. 49023) Kenya Colony. (Heller) 1911–12.
2 (U.S.N.M. 62898–9) Morogoro, T. T. (Loveridge) 1916.

Heller's specimen illustrates how much larger a size the lowland examples of this snake attain; it measures 565 (446+119) mm., whilst the largest of 63 mountain snakes which I collected in 1926 only measured 488 (350+138) mm. and was much above the average. The scale rows at neck, mid-body, and anus of these three snakes are as follows:

No. 49023. Scale rows, 21, 19, 17; ventrals, 145; subcaudals, 50.
No. 62898. Scale rows, 19, 19, 17; ventrals, 141; subcaudals, 76.
No. 62899. Scale rows, 21, 17, 16; ventrals, 141; subcaudals, 68.

### Genus BOAEDON Duméril and Bibron

#### BOAEDON LINEATUS Duméril and Bibron

*Boaedon lineatus* Duméril and Bibron, 1854, Erpét. Gén., vol. 7, p. 363.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 727.

*Boodon lineatus* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 332.

1 (U.S.N.M. 16754) Mt. Kilimanjaro, T. T. (Abbott) 1888–89.
2 (U.S.N.M. 20130–1) Lamu Id., K. C. (Denhardt) 1892.
2 (U.S.N.M. 40768–9) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 40895, 41692) Juja Farm, K. C. (Sm. Afr. Expd.) 1909.
1 (U.S.N.M. 41134) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
6 (U.S.N.M. 41971–2, 42062, 42067, 49024–5) K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42031, 42034) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 48582–3) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 49076) Kaimosi, K. C. (Heller) 1912.
1 (U.S.N.M. 49375) ? Kakumega, K. C. (Heller) 1912.
2 (U.S.N.M. 63479–80) Budonga Forest, U. (Raven) 1920.

The mid-body scale rows range from 23 to 33; ventrals, 190 to 239; subcaudals, 44 to 71; all being within the recognized range of variation of this common and widely distributed species. The largest snake (No. 42031) measures 951 (910+41) mm., while the smallest (No. 41971) is only 92 (55+37) mm.

## Genus LYCOPHIDION Duméril and Bibron

### LYCOPHIDION CAPENSE (Smith)

*Lycodon capensis* Smith, 1831, South Afr. Quart. Journ., vol. 1, No. 5, p. 18, and 1838, Illus. Zool. S. Africa, vol. 3, pl. 5.
*Lycophidium capense* Boulenger, 1893, Cat. Snakes, Brit. Mus., vol. 1, p. 339.
*Lycophidium jacksoni* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 340, pl. 21, fig. 3. (Type localities Kilimanjaro, T. T., and Lamu Id., K. C.)

1 (U.S.N.M. 40885) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 40966–7) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41133) Mount Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42023) ? Lake Sirgoit, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42049) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 48590) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 49388) Kaimosi, K. C. (Heller) 1912.
1 (U.S.N.M. 66928) Between Abyssinia and K. C. (Mearns) 1912.

All agree in having 17 scale rows except No. 66926, which has 16; ventrals, 171 to 193; subcaudals, 28 to 39. The largest specimen (No. 66928) measures 467 (420+47) mm. and the smallest (No. 49388) 203 (180+23) mm.

For a considerable time I have entertained doubts as to the status of *L. jacksoni* Boulenger which was described from two smallish snakes, measuring 192 and 222 mm., respectively. All of its characters as enumerated by the author were already within the recognized range of variation of *L. capense*, except that in *L. jacksoni* the diameter of the eye was "not greater than its distance from the mouth," while in *L. capense* the diameter was "considerably greater."

The present series may be sorted into two groups—those with the diameter of the eye "just greater" and those where it is "much greater"; if these are then arranged according to length it will be found that those from 203 to 371 mm. have the diameter "much greater," while those from 389 to 467 mm. are of the "just greater" group—that is to say, the proportionate largeness of the eye is an age character, the eye being larger in the young and diminishing proportionately with age. In the types of *L. jacksoni* the adult condition seems to have been attained while the snakes were still of small size, yet it is hardly possible to keep them distinct on such grounds when typical *L. capense* as well as those where the eye diameter corresponds to *L. jacksoni* occur between the type localities of the latter.

After writing the foregoing I communicated with Mr. H. W. Parker who I knew had been recently engaged in studying the genus. He replied that in his revision, publication of which is likely to be delayed, he had placed *L. jacksoni* in the synonymy of *L. capense* and has very kindly allowed me to quote his reasons here. He writes: "*L. jacksoni* Boulenger differs only from *L. capense* in the

smaller eye and the coloration. The size of the eye expressed as a fraction of the length of the head (to the hinder edge of the parietals) is found to vary in *L. capense* from 0.11 to 0.19; in the type of *L. jacksoni* the same ratio is 0.13 and the color pattern of this form is also found in specimens with a much longer eye."

### Genus MEHÉLYA Csiki

#### MEHÉLYA CHANLERI (Stejneger)

*Simocephalus chanleri* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 726. (Wange, Manda Id., K. C.).—Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 617.

Type (U.S.N.M. 20126) Wange, Manda Id., K. C. (Denhardt) 1892. Not examined.

### Genus PSEUDASPIS

#### PSEUDASPIS CANA (Linnaeus)

*Coluber canus* Linnaeus, 1758, Syst. Nat., ed. 10, vol. 1, p. 221.
*Pseudaspis cana* Boulenger, 1893, Cat. Snakes Brit. Mus., vol. 1, p. 373.

4 (U.S.N.M. 41520, 41696, 41700, 42002) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41671) Nyeri, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49221) Kenya Colony. (Heller) 1911–12.

Mid-body scale rows, 25 to 29; ventrals, 187 to 213; subcaudals, 36 to 52. No. 41671 has a subcaudal subdivided so that there are three scales in a row; the last ventral of this snake is also divided. In No. 41696 three or four of the last ventrals show a tendency to divide. The largest snake, partly skinned but head and tail complete (No. 41671), measures 1395 (1240+155) mm., the smallest (No. 42002) 350 (310+40) mm.

### Genus CHLOROPHIS Hallowell

#### CHLOROPHIS EMINI (Günther)

*Ahaetulla emini* Günther, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 325.
*Chlorophis emini* Boulenger, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 92.—Loveridge, 1916, Journ. East Afr. and Uganda Nat. Hist. Soc., p. 78. (Variations in Kenya Colony specimens.)

2 (U.S.N.M. 49009–10) Kenya Colony. (Heller) 1911–12.
2 (U.S.N.M. 49385–86) Kaimosi, K. C. (Heller) 1912.

The first two snakes listed above probably came from Kaimosi also, certainly from the northwest corner, near Elgon.

Mid-body scale rows, 15; ventrals, 172 to 186; subcaudals, 111 to 121; labials very variable, in one there are 8 upper labials with third, fourth, and fifth entering the orbit, another has 8 with fourth, fifth, and sixth entering the orbit; two agree in having 8 labials with the third, fourth, and fifth entering the orbit on the right side of the head,

but have the normal 9 labials with fourth, fifth, and sixth entering the orbit on the left side. In one snake (No. 49386) the fifth upper labial on the right side and the sixth on the left have fused with the lower postoculars to form single scales. The largest snake measures 710 (473+237) mm. and the smallest 336 (231+105) mm.

#### CHLOROPHIS HOPLOGASTER (Günther)

*Ahaetulla hoplogaster* Günther, 1863, Ann. Mag. Nat. Hist., ser. 3, vol. 11, p. 284.

*Chlorophis hoplogaster* Boulenger, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 93.—Loveridge, 1916, Journ. East Afr. and Uganda Nat. Hist. Soc., p. 78. (Variations in Kenya Colony specimens).

2 (U.S.N.M. 49003, 49075) Kaimosi, K. C. (Heller) 1912.
2 (U.S.N.M. 49012, 49021) Kenya Colony. (Heller) 1911–12.

Mid-body scale rows, 15; ventrals, 154 to 166; subcaudals, 88 to 100; labials 8, the fourth and fifth entering the orbit. No. 49012 is an intermediate between *C. hoplogaster* and *C. neglectus* in that posteriorly its ventral scutes show traces of a keel; anteriorly they are typical. The largest snake measures 910 (690+220, tip of tail missing) mm.; and smallest 486 (356+130) mm.

#### CHLOROPHIS NEGLECTUS (Peters)

*Philothamnus neglectus* Peters, 1866, Monatsber. Akad. Wiss. Berlin, p. 890. (Prazo Boror, Mozambique.)

*Chlorophis neglectus* Boulenger, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 94.—Loveridge, 1916, Journ. East Afr. and Uganda Nat. Hist. Soc., p. 79.

14 (U.S.N.M. 40766–7, 40953–8, 40984–5, 40988, 41512–3, 41978) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 40999, 41693) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41135–6) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41970) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
5 (U.S.N.M. 42048, 42063–4, 42256, 49007) Kenya Colony. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42935–6) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 48588) Mtoto Andei, K. C. (Heller) 1911.

Mid-body scale rows, 15; ventrals, 152 to 170; subcaudals, 98 to 117; the labials in 21 of the 27 snakes are normal—that is, have 8 upper labials, of which the fourth and fifth enter the orbit—one has 7 with third and fourth entering the orbit; another 7 with fourth and fifth on the left side; and 9 with the fifth and sixth on the right side; yet another has 9 with fifth and sixth on both sides; and No. 42063 is normal on the right side but with 8 labials on the left, of which the fifth and sixth enter the orbit. Numerous minor variations occur in this series, such as division or fusion of the ventral scutes. No. 40988 presents a peculiarity in having its two last ventrals fused into a single shield except for a small suture remaining in the middle.

The largest snake (No. 49007) measures 920 (645+275) mm. and the smallest 233 (168+65) mm. The former is, I believe, the largest specimen recorded and far exceeds any which I have examined in the fine series in the Nairobi Museum.

CHLOROPHIS NEGLECTUS variety

1 (U.S.N.M. 41701) Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (No tag) ? Kenya Colony.

These two snakes differ from the long series of *C. neglectus* in the National Collection in having an undivided anal like the West African *C. heterodermus*. No. 41701 has 15 mid-body scale rows; 167 ventrals, single anal; 105 subcaudals; 8 labials, of which the fourth and fifth enter the orbit. The other agrees except for 164 ventrals and 104 subcaudals. The smaller has the ventral keel very weakly defined, yet I consider both to be but aberrations of *C. neglectus*.

CHLOROPHIS ? HETEROLEPIDOTUS (Günther)

*Ahaetulla heterolepidota* GÜNTHER, 1863, Ann. Mag. Nat. Hist., ser. 3 (7) vol. 11, p. 286.
*Chlorophis heterolepidotus* BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 95.

Head only (U.S.N.M. 42479) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.

This head has 9 labials on the right, 10 on the left side, with fifth sixth, and seventh entering the orbit of both. The anterior ventrals show a keel, but it is impossible to say whether the specimen should be referred to *C. heterolepidotus* or *C. irregularis* of Leach.

CHLOROPHIS IRREGULARIS (Leach)

*Coluber irregularis* LEACH, 1819, in Bowdich, Miss. Ashantee, p. 494.
*Chlorophis irregularis* BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 96.

2 (U.S.N.M. 49002, 49387) Kaimosi, K. C. (Heller) 1912.

Mid-body scale rows, 15; ventrals, 167 to 171; subcaudals, 132; tail of one mutilated; labials, 9 in one, 10 in the other, both with fourth, fifth, and sixth entering the orbit. Temporals, 1+2, 2+1, and 2+2. In passing, it might be remarked that *C. irregularis* forms a connecting link between the genera *Chlorophis* and *Philothamnus*. In the specimens before me the subcaudal scales are undoubtedly slightly keeled and notched and on examining typical West Coast *irregularis* in the collection of the Museum of Comparative Zoölogy I find that this is also sometimes the case though other examples conform to the typical condition of *Chlorophis*. There do not appear to be any good characters by which to differentiate these two genera though for the present it is perhaps better to keep them distinct. The perfect snake measures 810 (535+280) mm.

### Genus PHILOTHAMNUS Smith

#### PHILOTHAMNUS SEMIVARIEGATUS Smith

*Philothamnus semivariegatus* Smith, 1849, Illustr. Zool. S. Africa, vol. 3, pls. 59, 60, and 64.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 728.—Boulenger, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 99.

2 (U.S.N.M. 20098, 20105) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M 20128) Manda Island, K. C. (Denhardt) 1892.

Mid-body scale rows, 15; ventrals, 169 to 182; subcaudals, 138 to 148; labials, 9, the fifth and sixth entering the orbit (Tana River), the fourth, fifth, and sixth in the Manda Island snake; temporals, 2+2. The largest specimen measures 1,102 (717+385, the tip of the tail missing) mm., the other reptiles are but slightly smaller.

### Genus HAPSIDOPHRYS Fischer

#### HAPSIDOPHRYS LINEATA Fischer

*Hapsidophrys lineatus* Fischer, 1856, Abh. Natur. Ver. Hamburg, vol. 3, p. 111, pl. 2, fig. 5.—Boulenger, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 104.

3 (U.S.N.M. 49026–7, 49457) Kenya Colony. (Heller) 1911–12.
1 (U.S.N.M. 49085) Kisumu, K. C. (Heller) 1912.

This snake has never before been recorded east of Uganda, and though many West African species have turned up in the forested areas around Mount Elgon to the north of Kisumu, the latter seems an improbable habitat for a forest species. Kisumu certainly has many trees scattered through the European residential section on the hill, while only a couple of miles below is Port Florence, on Lake Victoria, where boats arrive almost daily from Uganda. *H. lineatus* has long been known from Uganda and it is possible that these snakes may have been accidentally imported with produce and become established, or may have been brought over by natives to sell.

Mid-body scale rows, 15; ventrals, 156 to 166; subcaudals, 90 to 108; temporals, 2+1 (instead of 1+2) in three snakes; the fourth has 2+1 and 2+2 on the right and left sides respectively; labials and other scalation normal. The largest snake measures 970 (685+285) mm., the smallest 417 (305+112) mm.

### Genus RHAMNOPHIS Günther

#### RHAMNOPHIS AETHIOPISSA ELGONENSIS, new subspecies

*Thrasops rothschildi* (part) Loveridge (not of Mocquard), 1916, Journ. East Afr. and Uganda N. H. Soc., pp. 79 and 84; also 1923, Proc. Zool. Soc. London, p. 879 (Yala (=Lukosa) River records only).

*Relations.*—In going over the snakes of the genera *Rhamnophis* and *Thrasops* in the collection of the Museum of Comparative Zoölogy, where all the six described species are represented, I find that I was in error in referring certain East African tree snakes to

*Thrasops rothschildi* Mocquard and that it is necessary to describe them as new.

The characters on which Schmidt[8] has proposed to distinguish these two genera are not altogether satisfactory and I imagine that they will have to be united ultimately. Unfortunately he had not seen examples of *Rhamnophis aethiopissa* Günther when constructing his key for the genera and species, for this snake has smooth or slightly keeled dorsals and a high rostral, so that neither of these characters assists in separating *Rhamnophis* from *Thrasops*, as they are common to both. There yet remain—

Vertebral row of scales distinctly enlarged; large occipitals present. **Rhamnophis.**
Vertebral row of scales scarcely if at all enlarged; postparietals numerous, sometimes a little enlarged ..... **Thrasops.**

On the basis of these characters, therefore, I refer the new form to *Rhamnophis* (1862) and not to *Thrasops* (1857).

*Type.*—No. 18189, Museum of Comparative Zoölogy. An adult female taken on the Yala (=Lukosa) River at the foot of Mount Elgon, Kenya Colony. Collected by H. J. Allen Turner, October, 1915.

*Paratypes.*—Cat. No. 49005, U.S.N.M. Collected at Kaimosi, Kenya Colony by Edmund Heller, January, 1927. Also No. I–48 in the Museum of the Kenya Colony and Uganda Natural History Society, Nairobi, being the specimen referred to on pages 79 and 84 of the society's journal as cited above. In addition there were three other specimens collected by Mr. Turner about the same time that he presented one to the Natural History Society, and I purchased the snake now in the Museum of Comparative Zoology.

*Diagnosis.*—Differs from the West African *R. a. aethiopissa* Günther in having 15 mid-body scale rows (a constant feature in the East African specimens) and in having 7 (rarely 6) upper labials, with the third and fourth entering the orbit.

It differs from Schmidt's *R. ituriensis* in the 7 labials, the higher rostral, the broader frontal, smaller parietal, etc., which mark *ituriensis* off as very distinct from *aethiopissa*.

*Description.*—Agrees with *aethiopissa* except in the following points: Frontal markedly broader in the middle than in *aethiopissa;* 7 upper labials of which the third and fourth enter the orbit; chin shields broader; scales smooth or faintly keeled as in *aethiopissa*, but in 15 rows; ventrals 159 (160 to 163 in the paratypes); anal divided; subcaudals 133 (117 to 130 in the paratypes).

*Coloration.*—Differs from *aethiopissa* in lacking the spotting and edging of black on the head shields. Otherwise the color varies from that of *aethiopissa* to green, with each scale tipped and edged with black. Paratype No. 49005 shows a pair of light lateral longitudinal lines on the ventrals; the position of these lines is only

[8] 1923, Bull. Amer. Mus. Nat. Hist., vol. 49, art. 1, p. 81.

indicated in the type. The ventrals and subcaudals of this paratype are also freely sprinkled with black.

*Remarks.*—On general principles I should have preferred to expand the description of *aethiopissa* to include the present form were it not for the fact that all 6 East African specimens agree in possessing 15 scale rows and 7 labials, while West African snakes recorded since 1862 invariably have from 17 to 19 scale rows and 8 labial shields.

*Measurements.*—Length of head to end of parietals, 20 mm.; length of head and body, 760 mm.; length of tail, 387 mm.

*Material examined.*—

*R. a. aethiopissa* Togoland.
*R. a. elgonensis.* Six specimens from the vicinity of Mount Elgon.
*R. batesi* Niapu, Belgian Congo.
*R. ituriensis.* Paratype from Gamangui, Belgian Congo.
*T. flavigularis* Cameroons. (Several localities.)
*T. jacksoni* Kabare, Bukoba, Tanganyika Territory.
*T. rothschildi* Meru, Kenya Colony.

## Genus CORONELLA Laurenti

### CORONELLA SEMIORNATA Peters

*Coronella semiornata* PETERS, 1854, Monatsber. Akad. Wiss. Berlin, p. 622. (Tette, Mozambique).—BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 624.

1 (U.S.N.M. 41694) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.

This is a juvenile example and very dry, in consequence of which the identification is a little doubtful. Mid-body scale rows, 21; ventrals, 184; anal divided; subcaudals, 80; labials, 8, of which the fourth and fifth enter the orbit. Total length, 300 (233 + 67) mm.

### CORONELLA ? SCHEFFLERI Sternfeld

*Coronella scheffleri* STERNFELD, 1908, Sitzber. Ges. Naturf. Freunde, Berlin, p. 93; and 1908, Mitt. Zool. Mus. Berlin, p. 243, figs. 1 and 2. (Type locality Kibwezi, K. C.)

1 (U.S.N.M. 40931) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.

Mid-body scale rows, 21; ventrals, 201; anal divided; subcaudals, 91, paired except the first 2, which are single; labials, 8, of which the fourth and fifth enter the orbit.

This snake is intermediate between *C. semiornata* and *C. scheffleri*. It agrees with *semiornata* rather than *scheffleri* in the key character of its rostral which is a good deal broader than deep instead of only slightly.[9] Actually the depth is about 1.75 mm. and the length 2.5 mm. Nor does the snout project more than in a specimen of *semiornata* from Dar es Salaam or others from Kipetu, T. T. It also

[9] The "as deep as broad" of the original text was altered by the author in the second reference given above.

differs from *scheffleri* and agrees with *semiornata* in its internasals, which are as long as broad, not longer; the frontal is exactly as figured and not as stated in the text, "once and two-third times as long as broad"; it is much longer than its distance from the end of the snout, not "as long as its distance from the rostral"; it is shorter than the parietals, not equal to them. The number of its subcaudals are exactly the same as in the type of *scheffleri* and its ventrals only three more. Without topotypic material for comparison this identification must remain extremely doubtful.

It appears superficially much more slender than *semiornata*, but actually the mid-body diameter is included in the length 41 times in both the Ulukenya and Dar es Salaam snakes and the tail is included 3 and 3.2 times in the body length, respectively. The absence of hypophyses to its vertebrae preclude the idea of its being referable to the genus *Coluber* (*Zamenis* Authors), which has a representative farther to the north.

#### CORONELLA CORONATA (Schlegel)

*Calamaria coronata* SCHLEGEL, 1834, Phys. Serp., vol. 2, p. 46.
*Coronella coronata* BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 196.—SCHMIDT, 1923, Bull. Amer. Mus. Nat. Hist., vol. 49, art. 1, p. 87.

1 (U.S.N.M. 42230) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.

Mid-body scale rows, 19; ventrals, 179; anal divided; subcaudals 77; labials, 8, the fourth and fifth entering the orbit; 4 lower labials in contact with the anterior chin shields. Total length, 540 (420+120) mm.

This snake agrees perfectly in characters and color with a specimen of *C. coronata* from Sakbayeme, Cameroons (M. C. Z. 22831) as also with one from Niangara, Belgian Congo, referred to by Schmidt, with which author I agree in considering it probable that *C. regularis* (Fischer) should be united with *C. coronata*, for the Rhino Camp snake also agrees in coloring with *C. regularis*.

### Genus GRAYIA Günther

#### GRAYIA THOLLONI Mocquard

*Grayia tholloni* MOCQUARD, 1897, Bull. Soc. Philom. Paris, ser. 8, vol. 9, p. 11.—BOULENGER, 1909, Proc. Zool. Soc. London, p. 951, fig.

1 (U.S.N.M. 42153) Kenya Colony. (Sm. Afr. Exped.) 1909.

Mid-body scale rows, 15; ventrals, 143; anal divided; subcaudals, 110; labials 8 on left side, with the fourth entering the orbit, 9 on right side, with the fifth entering the orbit. Except for the extra labial on the right side and that the length of the lower anterior temporal equals its distance from the posterior nasal, this specimen agrees in every

respect with the revised description given by Boulenger in 1909. It is interesting to note, however, that it agrees with the type on the right side of its head in that the nasal rests on the first labial only, and with Boulenger's specimens on the left side where the nasal rests on the first and second labials.

### Genus DUBERRIA Fitzinger

#### DUBERRIA LUTRIX (Linnaeus) [10]

*Coluber lutrix* LINNAEUS, 1766, Syst. Nat., vol. 1, p. 375.
*Homalosoma lutrix* BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 274.

1 (U.S.N.M. 40695) Meru, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42015) ? Aberdare Mtns., K. C. (Sm. Afr. Exped.) 1909.

Mid-body scale rows, 15; ventrals, 110 to 140; subcaudals, 22 to 31; labials 6, the third and fourth entering the orbit; loreal present.

## Subfamily DASYPELTINAE

### Genus DASYPELTIS Wagler

#### DASYPELTIS SCABER (Linnaeus)

*Coluber scaber* LINNAEUS, 1758, Syst. Nat., ed. 10, vol. 1, p. 223.
*Dasypeltis palmarum* ?, *Dasypeltis abyssinia* ? STEJNEGER, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 733.
*Dasypeltis scabra* BOULENGER, 1894, Cat. Snakes Brit. Mus., vol. 2, p. 354.

2 (U.S.N.M. 16755–6) Mt. Kilimanjaro, T. T. (Abbott) 1888–89.
1 (U.S.N.M. 40990) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41974) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42016) Aberdare Mtns., K. C. (Sm. Afr. Exped.) 1909.
4 (U.S.N.M. 41975, 49019–20, 49053) K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49078) Kaimosi, K. C. (Heller) 1912.
1 (U.S.N.M. 49376) ? Kakumega, K. C. (Heller) 1912.
5 (U.S.N.M. 62901–5) Morogoro, T. T. (Loveridge) 1916–17.
1 (U.S.N.M. 62906) Lumbo, Mozambique. (Loveridge) 1918.
1 (U.S.N.M. 62907) Mbunyi, K. C. (Loveridge) 1916.
1 (U.S.N.M. 63078) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 63481) Budonga Forest, U. (Raven) 1920.

An interesting feature of the distribution of this species is its occurrence at 10,000 feet on Mount Kenya as given on the label.

Mid-body scale rows, 21 to 26; ventrals, 205 to 247; anal entire; subcaudals, 45 to 86; labials, 7 (6 in one snake and on the left side only of two others), third and fourth (second and third on one side

[10] Regarding the question of synonymy, Dr. L. Stejneger has given me the following note:

"1826 Duberria Fitzinger Class. Rept. p. 31 (*Coluber canus*). Fitzinger in 1826 created *Duberria* for *C. canus* 'und Consorten'; among these consorts he quotes *Duberria arctirostris* = *Coluber duberria* Merrem = *Coluber lutrix* Linn., which consequently becomes the type by tautonomy of the genus *Duberria*. Consequently *Homalosoma* must give way to *Duberria*. Wagler's *Homalosoma* is only a substitute name for *Duberria* and a synonym of Fitzinger's genus as shown by Wagler's footnote 4 on p. 190 (Syst. Amph.)."

*Pseudaspis* was created by Fitzinger 1843, p. 25, type *Coluber canus* and was adopted by Boulenger from Cope's use of it in 1861 and is the proper name for it.

of No. 16755) entering the orbit. Stejneger has already discussed in detail the variations presented by the two uniformly brown Kilimanjaro reptiles.

Uniformly black snakes are listed above from Budonga Forest, Ug., Kaimosi, Kakumega, Kenya and Mbunyi in Kenya Colony. Those with rhombic pattern are from Guaso Nyiro and Aberdare Mountains in Kenya and from Morogoro in Tanganyiki Territory. A very pinkish form with transverse dorso-lateral stripes from Morogoro, T. T., and Lumbo, Portuguese East Africa.

The Mbunyi snake, measuring 867 (763 + 104) mm., appears to be the largest.

## Subfamily BOIGINAE

### Genus TARBOPHIS Fleischmann

#### TARBOPHIS SEMIANNULATUS (Smith)

*Telescopus semiannulatus* (SMITH), 1849, Illustr. Zool. S. Africa, vol. 3, pl. 72.
*Tarbophis semiannulatus* BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 51.—LOVERIDGE, 1923, Proc. Zool. Soc. London, p. 881.

4 (U.S.N.M. 62908–11) Morogoro, T. T. (Loveridge) 1916–17.

Mid-body scale rows, 191; ventrals 204 to 229; subcaudals, 67 to 75; labials, 8, the third, fourth, and fifth entering the orbit except on the right side of No. 62908, where there are 9 labials, with the third, fourth, and fifth entering the orbit. In No. 62910 the upper temporal is divided on both sides. For size see reference given above.

These snakes, as also others from Lumbo, were captured in dry scrub country on reddish volcanic soil (Morogoro) or absolute sand (Lumbo); they are not associated with forest, nor have I even seen one in a bush, though they can undoubtedly climb. As one might suppose, they are nocturnal, emerging just after sunset.

### Genus CROTAPHOPELTIS Jan

#### CROTAPHOPELTIS HOTAMBOEIA HOTAMBOEIA (Laurenti)

*Coronella hotamboeia* LAURENTI, 1768, Syn. Rept., p. 85.
*Crotaphopeltis hotamboeia* STEJNEGER, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 728.
*Leptodira hotamboeia* BOULENGER, 1896, Cat. Snakes, Brit. Mus., vol. 3, p. 89.
*Crotaphopeltis hotamboeia hotamboeia* BARBOUR and LOVERIDGE, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 125.

5 (U.S.N.M. 20091–4, 20110) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 40952) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41695) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42032–3) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42253) Sururu Village, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 56046) East Africa. (Hurter) N. D.

Mid-body scale rows, 19; ventrals, 141 to 178; anals entire; subcaudals, 35 to 48; chin shields, 3 or 4 pairs; praeoculars, 1, not in

contact with the frontal except on the right side of No. 20091, where there are 2, of which the uppermost is in contact; postoculars, 2. The largest snake (No. 40952) measures 516 (444+72) mm.

### Genus HEMIRHAGERRHIS Boettger

#### HEMIRHAGERRHIS KELLERI Boettger

*Hemirhagerrhis kelleri* Boettger, 1893, Zool. Anz., vol. 16, p. 129.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 729.—Boulenger, 1896, Cat. Snakes, Brit. Mus., vol. 3, p. 119.

2 (U.S.N.M. 20100, 20112) Tana River, K. C. (Chanler) 1892.

These two examples of this rare snake have been described in detail by Stejneger in the citation given above.

Whether or no *Hemirhagerrhis* should be united with *Amplorhinus* is an open question. According to the descriptions given by Boulenger the only points of difference are as follows:

| Character | Hemirhagerrhis | Amplorhinus |
|---|---|---|
| Maxillary teeth | 9 or 10 | 12 or 13. |
| Mandibular teeth | Strongly enlarged anteriorly | Subequal. |
| Pupil | Vertically subelliptic | Round. |
| Nasal | Semidivided with horizontal cleft. | Semidivided (with obliquely vertical cleft). |
| Scales | Smooth | Smooth or feebly keeled. |

When compared with each other the difference in the mandibular teeth seems hardly worth generic distinction. The pupil, which is stated to be vertically subelliptic, is so very nearly round in both Uganda and Kenya specimens before me that the difference between them and the more completely circular pupils of *Amplorhinus* can only be appreciated by actual comparison and is of little use as a key character. The nasal cleft in *Hemirhagerrhis* is not actually horizontal, though it is certainly more so than in *Amplorhinus*. The color pattern of examples of *A. nototaenia* in which the vertebral stripe is retained shows a strong resemblance to that of *H. kelleri*.

### Genus AMPLORHINUS Smith

#### AMPLORHINUS NOTOTAENIA (Günther)

*Coronella nototaenia* Günther, 1864, Proc. Zool. Soc. London, p. 309, pl. 26, fig. 1.

*Hemirhagerrhis hildebrandtii* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 729.

*Amplorhinus nototaenia* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 125.

1 (U.S.N.M. 20106) Tana River, K. C. (Chanler) 1892.

There can be little doubt that *H. hildebrandtii* of Peters is a synonym of *A. nototaenia* from Rios de Sena, Zambesi. The scale formula and a detailed description of the Tana River snake has been given already by Stejneger.

### Genus TRIMERORHINUS Smith

#### TRIMERORHINUS TRITAENIATUS (Günther)

*Rhagerrhis tritaeniatus* Günther, 1863, Ann. Mag. Nat. Hist., ser. 4, vol. 1, p. 423, pl. 19, fig. 8. (Type locality South East Africa.)

*Psammophylax variabilis* Günther, 1892, Proc. Zool. Soc. London, p. 557, pl. 35. (Type locality Shire Highlands, Nyasaland.)

*Trimerorhinus tritaeniatus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 139.—Loveridge, 1923, Proc. Zool. Soc. London, p. 882.

2 (U.S.N.M. 40893–4) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
8 (U.S.N.M. 40901–3, 41516–8, 41672–3) Lake Naivasha, K. C. 1909.
1 (U.S.N.M. 40968) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 40970, 40997, 41973) Guaso Nyiro, K. C. 1909.
1 (U.S.N.M. 41534) Athi Plains, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42008) Kapiti Plains, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42061) Kenya Colony. (Sm. Afr. Exped.) 1909.
4 (U.S.N.M. 48584–7) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 49080) Kaimosi, K. C. (Heller) 1912.

Mid-body scale rows, 17; ventrals, 163 to 178; anal divided; subcaudals, 44 to 63; labials, 8, the fourth and fifth entering the orbit except on the left side of Nos. 40903 and 40970, where there are 9 labials with the fifth and sixth entering the orbit; also No. 48586, where there are 9 on the right side only, the fourth and fifth entering the orbit.

The scale counts of *T. variabilis* (Günther) have always been recognized as within the limits of variation of *T. tritaeniatus*, but *variabilis* was distinguished on the character that the rostral was slightly broader than deep; correspondingly its upper portion was about a third instead of "about half" its distance from the frontal. In the present series 13 snakes have the rostral broader than deep (*variabilis*), two are deeper than broad (*tritaeniatus*) and five are intermediate, being as broad as deep (Nos. 40968, 40970, 42008, 42061, and 48587). The snakes composing this fine series are obviously one species, and as there is no essential color pattern difference between *variabilis* and *tritaeniatus*, I propose uniting both species under the older name.

### Genus RHAMPHIOPHIS Peters

#### RHAMPHIOPHIS OXYRHYNCHUS (Reinhardt)

*Psammophis oxyrhynchus* Reinhardt, 1843, Vid. Selsk. Skrift., vol. 10, p. 244, pl. 1, figs. 10 and 12.

*Rhamphiophis rostratus* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 733.

*Rhamphiophis oxyrhynchus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 146.

1 (U.S.N.M. 20111) Tana River, K. C. (Chanler) 1892.

Mid-body scale rows, 17; ventrals, 162; anal divided; subcaudals, 95; labials, 8, the fifth entering the eye. Stejneger has already remarked on an abnormalty of the labials. Total length, 910 (630 + 280) mm.

### Genus DROMOPHIS Peters

#### DROMOPHIS LINEATUS (Duméril and Bibron)

*Dryophylax lineatus* Duméril and Bibron, 1854, Erpét. Gén., vol. 7, p. 1124.
*Dromophis lineatus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 149.

2 (U.S.N.M. 41258–9) Nile Camp, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42232) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.

Mid-body scale rows, 17; ventrals, 141 to 145; anals divided; subcaudals, 91 to 94; labials, 8, the fourth and fifth entering the orbit. Scalation normal. Largest snake measures 913 (622+291) mm.

### Genus PSAMMOPHIS Boie

#### PSAMMOPHIS SIBILANS (Linnaeus)

*Coluber sibilans* (part) Linnaeus, 1766, Syst. Nat., ed. 12, vol. 1, p. 383.
*Psammophis sibilans* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 161.

1 (U.S.N.M. 40992) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41698, 49011, 49052) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42042), Uasin Gishu, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42151) ? Nile (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42225) Uma Khor, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42250), Sururu Village, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42255) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 49096–7) Mazeras, K. C. (Heller) 1911.
1 (U.S.N.M. 49181) Voi, K. C. (Heller) 1911.

Mid-body scale rows, 17; ventrals, 161 to 174; anals divided; subcaudals, 64 to 98 (No. 42152, which has the lowest number of subcaudals yet recorded, has its tail undoubtedly intact; other snakes in this series have such low numbers as 74, 88, and 92); labials, 8, the fourth and fifth entering the orbit. (No. 42151 is an exception having 9 labials on the right side.) The largest snake (No. 42225) measures 1,635 (1191+444) mm.

#### PSAMMOPHIS SUBTAENIATUS (Peters)

*Psammophis sibilans* var. *subtaeniata* Peters, 1882, Reise nach Mossamb, vol. 3, p. 121.
*Psammophis sibilans* Stejneger (not of Linnaeus), 1893, Proc. U. S. Nat. Mus., vol. 16, p. 731.
*Psammophis subtaeniatus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 160.

1 (U.S.N.M. 20099) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 20129) Wange, Manda Id., K. C. (Denhardt) 1892.
1 (U.S.N.M. 42041) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42483) Mnyouri Jardin, U. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 42490–1) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 49217–8) Mount Lololokwi, K. C. (Heller) 1911.
1 (U.S.N.M. 66896) Bodessa, Abyssinia. (Mearns) 1912.

The Abyssinian record is the first for that country, to the best of my belief, without verifying my impression by a search through the somewhat voluminous records of this species.

Mid-body scale rows, 17; ventrals, 153 to 169; subcaudals, 96 to 111; labials, 8, the fourth and fifth entering the orbit. The largest snake (No. 49217) measures 1,185 (791+394) mm.

#### PSAMMOPHIS BISERIATUS Peters

*Psammophis biseriatus* Peters, 1881, Sitzb. Ges. Naturf. Freunde Berlin, p. 88.—Stejneger, 1893, Proc. U. S. Nat Mus., vol. 16, p. 731.—Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 168.

2 (U.S.N.M. 20095–6) Tana River, K. C. (Chanler) 1892.

The scale formulae and variations of these two snakes have been dealt with by Stejneger.

### Genus THELOTORNIS Smith

#### THELOTORNIS KIRTLANDII (Hallowell)

*Leptophis kirtlandii* Hallowell, 1844, Proc. Acad. Nat. Sci. Phila., p. 62.
*Thelotornis kirtlandii* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 733.—Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 185.

1 (U.S.N.M. 16024) East Africa. (Abbott) 1888–89.
1 (U.S.N.M. 20097) Tana River, K. C. (Chanler) 1892.

Mid-body scale rows, 15; ventrals, 162 to 164; anals divided; subcaudals, 116 to 147; labials, 8, the fourth and fifth entering the orbit. The larger specimen measures 1,059 (690+369) mm.

### Genus DISPHOLIDUS Duvernoy

#### DISPHOLIDUS TYPUS (Smith)

*Bucephalus typus* Smith, 1829, Zool. Journ., vol. 4, p. 441.
*Dishpholidus typus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 187.

1 (U.S.N.M. 40969) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42224) Logor, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 48591) Uganda. (Heller) 1912.
2 (U.S.N.M. 49004, 49007) Kaimosi, K. C. (Heller) 1912.
3 (U.S.N.M. 49008, 49017–8) Kenya Colony. (Heller) 1911–12.
1 (U.S.N.M. 49150) Mazeras, K. C. (Heller) 1911.

Mid-body scale rows, 19; ventrals, 161 to 185; anals divided; subcaudals, 93 to 116; labials, 7, the third and fourth entering the orbit. The largest Boomslang (No. 49018) measures 1,295 (979+316) mm.

Three types of coloration are represented by three examples of each. (1) Uniformly green from Logor, Uganda, Kenya Colony and Mazeras, K. C. (2) Green with black markings from Uganda, Kenya Colony, and Guaso Nyiro, K. C. (3) Uniformly brown, except for a few black markings on the neck of young snakes from Kenya Colony and Kaimosi, K. C.

## Genus APARALLACTUS Smith

### APARALLACTUS JACKSONII (Günther)

*Uriechis jacksonii* Günther, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 325, pl. 19, fig. E.

*Aparallactus jacksonii* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 256.—Loveridge, 1923, Proc. Zool. Soc. London, p. 889.

3 (U.S.N.M. 62919–21) Mount Longido, T. T. (Loveridge) 1916.

Mid-body scale rows, 15; ventrals, 134 to 144; anals single; subcaudals, 35 to 42 single; labials, 6 or 7, the third and fourth entering the orbit. In No. 62919 the symphysial is in contact with the chin shields.

The thin, black vertebral line of the type is lacking in two of the specimens, which are paler than the third; the latter has, in addition to the vertebral line, a row of white lateral scales bordered above and below by black dots, which would, if confluent, form lateral lines.

### APARALLACTUS CONCOLOR (Fischer)

*Uriechis concolor* Fischer, 1884, Jahrb. Hamb. Wiss. Anst., vol. 1, p. 4, pl. 1, fig. 1.

*Aparallactus concolor* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 257; 1896, Proc. Zool. Soc. London, p. 216.

*Elapops modestus* Angel (not of Günther), 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12). Paris, p. 36.

1 (U.S.N.M. 48589) Mtoto Andei, K. C. (Heller) 1911.

I should like to take this opportunity of correcting the erroneous record of the occurrence of the West African *Elapops modestus* at Bura, in the Wataita country of Kenya Colony. Through the kindness of Mons. Angel I have been enabled to examine this snake which appears to be the most southerly record for *A. concolor*. It only differs from that species in that the posterior chin shields are slightly shorter, not longer, than the anterior. It has 154 ventrals and 45 subcaudals.

The Mtoto Andei snake has 15 mid-body scale rows; ventrals, 155; anal entire; subcaudals, 59; labials 7, the third and fourth entering the eye. In these characters as well as all others the snake agrees perfectly with the description as given by Boulenger.

### APARALLACTUS CHRISTYI Boulenger

*Aparallactus christyi* Boulenger, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 5, p. 512.

1 (U.S.N.M. 66929) between Abyssinia and K. C. (Mearns) 1912.

Mid-body scale rows, 15; ventrals, 172; anal single; subcaudals, 49 single; labials, 7, the third and fourth entering the orbit. The type, collected in the Mabira Forest, Uganda, is, I believe, the only other

known specimen. It differs in having 163 ventrals and 34 subcaudals, but that Mearns's specimen is specifically identical I have little doubt, for it agrees precisely with Boulenger's detailed description of all the peculiarities of this rare snake. It measures 424 (350+74) mm. as against 270 (235+35) mm. of the type.

## Subfamily ELAPINAE

### Genus BOULENGERINA Dollo

#### BOULENGERINA STORMSI Dollo

*Boulengerina stormsi* DOLLO, 1886, Bull. Mus. Belg., vol. 4, p. 159.—BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 357.

1 (U.S.N.M. 63378) Kigoma, Lake Tanganyika, T. T. (Raven) 1920.

Mid-body scale rows, 21; ventrals, 194; end of tail missing. Length of head and body only 334 mm. This fine specimen of the somewhat rare aquatic "cobra" of Lake Tanganyika was collected on March 23, 1920. In 1926 Mr. Claude Grant, provincial commissioner at Kigoma and well-known ornithologist, informed me that these snakes appear to be getting scarcer each year, though from time to time he still sees one swimming in the lake.

### Genus NAJA Laurenti

#### NAJA HAJE (Linnaeus)

*Coluber haje* LINNAEUS, 1758, Syst. Nat., ed. 10, vol. 1, p. 225.
*Naia haie* BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 374.

1 (U.S.N.M. 48592) Mtoto Andei, K. C. (Heller) 1911.

The literature of the Egyptian cobra, as far as East Africa is concerned, consists of a number of isolated records from widely separated localities. It is difficult to understand why it should be so scarce when its relative, the black-necked cobra, is so abundant.

Mid-body scale rows, 21; ventrals, 208; subcaudals, 60; labials, 7, all excluded from the orbit.

#### NAJA MELANOLEUCA Hallowell

*Naia haie* var. *melanoleuca* HALLOWELL, 1857, Proc. Acad. Nat. Sci. Philad., p. 61.
*Naia melanoleuca* BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 376.

1 (U.S.N.M. 49013) Kenya Colony. (Heller) 1911–12.

Mid-body scale rows, 19; ventrals, 117; subcaudals, 61; labials, 7, the third and fourth entering the orbit. Total length 950 (792+158) mm.

NAJA NIGRICOLLIS Reinhardt

*Naja nigricollis* Reinhardt, 1843, Dansk. Vidensk. Selsk. Afh., vol. 10, p. 269, pl. 3, figs. 5 and 7.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 734.—Boulenger, Cat. Snakes Brit. Mus., vol. 3, p. 387.
Cobra Roosevelt, 1910, African Game Trails, pp. 196 and 203.

1 (U.S.N.M. 20090) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 40899) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
4 (U.S.N.M. 40900–1, 40994, 49054) Nr. Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 40993, 42215) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42157) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
2 skins without data and unregistered.

Mid-body scale rows, 17 to 25; ventrals, 184 to 215; anal entire; subcaudals, 57 to 67; labials, 6, the third entering the orbit. These scale counts are typical; one snake has two unpaired subcaudals next the anus. Most of the specimens have had the body skinned out while the head and tail are intact, which makes the measurements of the largest snake (No. 40900) possibly a little exaggerated. It measures 2026 (1650+376) mm.; the smallest is the Tana River cobra, whose variations have been discussed by Stejneger. The color of this snake is the most remarkable of any cobra I have ever examined; doubtless in life it was uniformly bright pink, with a complete black collar (11 to 12 scales in width) around its "neck." The rest of the series present most of the chief color variations of this interesting reptile—black, brown, khaki, olive, and bluish-gray, with or without markings.

At this camp [11] we killed five poisonous snakes—a light-colored tree snake, two puff adders, and two 7-foot cobras. One of the latter three times "spat" or ejected its poison at us, the poison coming out from the fangs like white films or threads to a distance of several feet. A few years ago the singular power of this snake, and perhaps of certain other African species thus to eject the poison at the face of an assailant was denied by scientists; but it is now well known. Selous had already told me of an instance which came under his own observation; and Tarlton had once been struck in the eyes and for the moment nearly blinded by the poison. He found that to wash the eyes with milk was of much relief. (Roosevelt, pp. 195–196.)

Another 7-foot cobra was killed. (Roosevelt, p. 203.)

## Genus DENDRASPIS Schlegel

DENDRASPIS JAMESONII (Traill)

*Elaps jamesonii* Traill, 1843, in Schlegel, Essai Phys. Serpents, English Translation, p. 179, p. 2, figs. 19 and 20.
*Dendraspis jamesonii* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 436.

1 (U.S.N.M. 49014) ? Kakumega, K. C. (Heller) 1912.

Mid-body scale rows, 15; ventrals, 215; subcaudals, 104; labials, 8, the fourth entering the orbit. Length 1,800 (1360+440) mm.

[11] Sotik, Guaso Nyiro, K. C.

Doubtless this specimen did come from Kakumega, as I have examined many from that locality collected by Mr. H. J. Allen Turner.

## Family VIPERIDAE

### Genus CAUSUS Wagler

#### CAUSUS RHOMBEATUS (Lichtenstein)

*Sepedon rhombeatus* LICHTENSTEIN, 1823, Verz. Doubl. Mus. Berlin, p. 106.
*Causus rhombeatus* STEJNEGER, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 735.—LOVERIDGE, 1916, Journ. E. Afr. & Uganda Nat. Hist. Soc., vol. 5, p. 87.—BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 467.

2 (U.S.N.M. 16757–8) Kilimanjaro, T. T. (Abbott) 1888–9.
2 (U.S.N.M. 22092–3) Mt. Kenja, K. C. (Chanler) 1892.
2 (U. S. N. M. 40896–42007) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
8 (U.S.N.M. 40961–4, 42486, 62922–4) Nairobi and vicinity, K. C. (Sm. Afr. Exped. & Loveridge) V. D.
1 (U.S.N.M. 42160) Kampala, U. (Sm. Afr. Exped.) 1909.

Mid-body scale rows, 17 to 19; ventrals, 143 to 156; anals, entire; subcaudals, 21 to 26; labials, 6, usually the fifth the largest but sometimes the third or fourth; temporals 2+3 in all except three snakes, where they are 2+4. The largest snake (No. 40961) measures 596 (540+56) mm.

#### CAUSUS RESIMUS (Peters)

*Heterophis resimus* PETERS, 1862, Monatsber. Akad. Wiss. Berlin, p. 277, pl.—, fig. 4. (Gebel Ghule, Senaar.)
*Causus nasalis* STEJNEGER, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 735.
*Causus resimus* BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 468.

2 (U.S.N.M. 20088–9) Tana River, K. C. (Chanler) 1892.
3 (U.S.N.M. 49016, 49022) Kenya Colony. (Heller) 1911–12.

The first two specimens are paratypes of *C. nasalis* Stejneger. Mid-body scale rows, 20 to 22; ventrals, 134 to 153; anals entire; subcaudals, 21 to 25; labials, 6, the third the largest, except in No. 49016, where the second is the largest on one side only. In No. 49016 the internasal is in contact with the loreal on the left side, but not on the right; in the others it is excluded from contact on both sides. The largest snake (No. 49022) measures 492 (444+48) mm.

#### CAUSUS DEFILIPPII (Jan)

*Heterodon defilippii* JAN, 1862, Arch. Zool. Anat. Phys., vol. 2, p. 225.
*Causus defilippii* BOULENGER, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 469.—LOVERIDGE, 1923, Proc. Zool. Soc. London, p. 894.

7 (U.S.N.M. 62925–31) Morogoro, T. T. (Loveridge) 1916.

Mid-body scale rows, 17; ventrals, 112 to 123; anals entire; subcaudals, 13 to 16; labials, 6, the fifth usually the largest. In every specimen the frontal is *longer* than its distance from the end of the snout. These specimens are 7 of the series of 15 discussed in the Proceedings of the Zoological Society for 1923.

### Genus VIPERA Laurenti

#### VIPERA HINDII Boulenger

*Vipera hindii* Boulenger, 1910, Ann. Mag. Nat. Hist., ser. 8, vol. 5, p. 513.—Meek, 1910, Field Mus. Nat. Hist. Pub., vol. 7, p. 405.—Loveridge, 1916, Journ. E. Afr. & Uganda Nat. Hist. Soc., vol. 5, p. 87.—Angel, 1925, Reptiles et Batraciens, vol. 2, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912). Paris, p. 37, fig. 5.

1 (U.S.N.M. 42021) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49409) Aberdare Mtns., K. C. (Heller) 1911.

Mid-body scale rows, 25; ventrals, 131 to 136; anals entire; subcaudals, 25 to 32; labials, 8. The larger specimen, which surpasses the type and is the largest on record, being longer than either those in the Paris or Nairobi Museum, is 330 (297+33) mm.

The revised scale formula for this rare snake (after embodying the data from all six examples known to me) now stands as follows: Scales, 25 to 28; ventrals, 130 to 144;[12] anal single; subcaudals 25 to 36; labials 8 or 9.

### Genus BITIS Gray

#### BITIS ARIETANS (Merrem)

*Vipera* (*Echidna*) *arietans* Merrem, 1880, Tent. Syst. Amphib., p. 52.—Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 493.
*Puff Adder*, Roosevelt, 1910, African Game Trails, pp. 188, 196, 290, 291, 389.

3 (U.S.N.M. 40787, 40996, 49055) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41519) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41697) Njoro Osolali, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42161) Kitesi, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42162) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42223) Kikonda, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42480) Lake Hannington, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 49048, 49050–1) Kakumega, K. C. (Heller) 1912.
1 (U.S.N.M. 49055) Guaso Nyiro, K. C. (Heller) 1911–12.

Mid-body scales in 31 to 34 rows; ventrals, 131 to 143; subcaudals, 16 to 35; labials, 12 to 15. The largest snake, a skin with head and tail attached, measures 940 (810—130) mm.

One of Kermit's gun bearers saw a puff adder (among the most deadly of all snakes); with delightful nonchalance he stepped on its head and then held it up for me to put my knife through its brain and neck. I slipped it into my saddle pocket, where its blood stained the pigskin cover of the little pocket Nibelungenlied which that day I happened to carry. (Roosevelt, p. 188.)

On the bigger puff adder, some 4 feet long, were a dozen ticks, some swollen to the size of cherries; apparently they were disregarded by their sluggish and deadly host. (Roosevelt, p. 196.)

Tarlton, by the way, told me an interesting anecdote of a white-tailed mongoose and a snake. The mongoose was an inmate of the house where he dwelt with his brother and was quite tame. One day they brought in a rather small puff adder, less than 2 feet long, put it on the floor, and showed it to the mongoose. Instantly the latter sprang toward the snake, every hair in its body and tail on

[12] According to Meek.

end, and halted 5 feet away, while the snake lay in curves like the thong of a whip, its head turned toward the mongoose. Both were motionless for a moment. Then suddenly the mongoose seemed to lose all its excitement; its hair smoothed down; and it trotted quietly up to the snake, seized it by the middle of the back—it always devoured its food with savage voracity—and settled comfortably down to its meal. Like lightning the snake's head whipped round. It drove its fangs deep into the snout or lip of the mongoose, hung on for a moment, and then repeated the blow. The mongoose paid not the least attention, but went on munching the snake's body, severed its backbone at once, and then ate it all up, head, fangs, poison, and everything; and it never showed a sign of having received any damage in the encounter. I had always understood that the mongoose owed its safety to its agility in avoiding the snake's stroke, and I can offer no explanation of this particular incident. (Roosevelt, pp. 290–291.)

There were a good many poisonous snakes. I killed a big puff adder with 13 eggs inside it; and we also killed a squat, short-tailed viper, beautifully mottled, not 18 inches long, but with a wide flat head and a girth of body out of all proportion to its length; and another very poisonous and vicious snake, apparently of colubrine type, long and slender. (Roosevelt, p. 389.)

#### BITIS NASICORNIS (Shaw)

*Coluber nasicornis* Shaw, 1802, Nat. Miscell., vol. 3, pl. 94.
*Bitis nasicornis*, Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 500.

32 (U.S.N.M. 48967–94, 48997–49000) Kenya Colony. (Heller) 1912.
2 (U.S.N.M. 48995–6) Lukosa River, K. C. (Heller) 1912.
1 (U.S.N.M. 49001) Kainosi, K. C. (Heller) 1912.
1 (U.S.N.M. 49049) Kakumega, K. C. (Heller) 1912.

Nos. 48981–6 were not submitted for examination, the others had mid-body scale rows, 33 to 37; ventrals, 122 to 127; anals, single; subcaudals, 12 to 29; labials, 15 to 20. The largest snake, a skin with head and tail attached, measured 968 (894+74) mm.

### Genus ECHIS Merrem

#### ECHIS CARINATUS (Schneider)

*Pseudoboa carinata* Schneider, 1801, Hist. Amph., vol. 2, p. 285.
*Echis carinatus* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 505; 1896, Proc. Zool. Soc. London, p. 217. (Lake Stephanie, K. C.)

1 (U.S.N.M. 49056) Guaso Nyiro, K. C. (Heller) 1912.
1 (U.S.N.M. 66897) North of Guaso Nyiro, K. C. (Rafferty) 1912.
1 (U.S.N.M.) 66898) Dussia, east of southern end of Lake Rudolph, K. C. (Mearns) 1912.
1 (U.S.N.M. 66905) Lake Rudolph, K. C. (Mearns) 1912.

On June 11, 1895, Dr. A. Donaldson Smith collected a desert saw viper near Lake Stephanie as recorded by Boulenger in 1896. Lake Stephanie lies just west of Lake Rudolph. The record, however, lapsed into oblivion and was omitted by Boulenger from his "List of the Snakes of East Africa * * *," published in 1915.

The rediscovery of this Indian and North African species in Kenya Colony is therefore of considerable interest. The five localities are all in the same general region. Geographically there is nothing very surprising in the finding of this desert snake in so arid a region for

*Coluber florulentulus* and *Eryx thebaicus* of the North African fauna have also penetrated to the south of Rudolph, *Eryx*, in fact, occurring in dry areas as far south as Kahe in the vicinity of Mount Kilimanjaro, in Tanganyika Territory.

Mid-body scale rows, 27 to 29; ventrals, 165 to 172; anals single; subcaudals, 28 to 36 in a single series; labials, 10 to 11. In these as in all other characters the above specimens agree with typical *Echis carinatus*.

### Genus ATHERIS Cope

#### ATHERIS SQUAMIGER (Hallowell)

*Echis squamigera* Hallowell, 1854, Proc. Acad. Nat. Sci. Philad., p. 193.
*Atheris squamiger* Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 509.

1 (U.S.N.M. 49006) Kenya Colony. (Heller) 1911–12.

Mid-body scale rows, 21; ventrals, 158; anal single; subcaudals, 50; labials, 10. Total length, 547 (465+82) mm.

### Genus ATRACTASPIS Günther

#### ATRACTASPIS ROSTRATA Günther

*Atractaspis rostrata* Günther, 1868, Ann. Mag. Nat. Hist., ser. 4, vol. 1, p. 429, pl. 19, fig. 1.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 735.—Boulenger, 1896, Cat. Snakes Brit. Mus., vol. 3, p. 514.

1(U.S.N.M. 20127) Wange, Manda Id., K. C. (Denhardt) 1892.

Mid-body scale rows, 23; ventrals, 212; anal single; subcaudals in 23 single rows; labials, 5, third and fourth entering the orbit. This snake agrees perfectly with the description as given by Boulenger except for the small number of ventrals, 212, as against the hitherto recognized range of 227 to 276.

## Suborder Lacertilia

## Family GEKKONIDAE

### Genus HEMIDACTYLUS Cuvier

#### HEMIDACTYLUS MABOUIA (Moreau de Jonnés)

*Gecko mabouia* Moreau de Jonnés, 1818, Bull. Soc. Philom. Paris, p. 138 (Antilles and adjacent mainland).
*Hemidactylus mabouia* Boulenger, 1885, Cat. Lizards Brit. Mus., vol. 1, p. 122.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 714.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 442.

2 (U.S.N.M. 16748, 16750) Mt. Kilimanjaro, T. T. (Abbott) 1888–89.
1 (U.S.N.M. 20087) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 22090) Jombeni Range, K. C. (Chanler) 1892.
1 (U.S.N.M. 48563) Mtoto Andei, K. C. (Heller) 1911.
2 (U.S.N.M. 49090–1) Mariakani, K. C. (Heller) 1911.
6 (U.S.N.M. 49299–304) ? Mt. Sagalla, K. C. (Heller) 1911.
1 (U.S.N.M. 49396) Mt. Mbololo, K. C. (Heller) 1911.
1 (U.S.N.M. 62826) Morogoro, T. T. (Loveridge) 1916.
1 (U.S.N.M. 63366) Zanzibar. (Raven) 1920.
1 (U.S.N.M. 63473) Mombasa, K. C. (Raven) 1920.

The series is comprised of eight males and nine females, all adults of average size. The sexes may be readily distinguished by the presence of femoral pores in the males, such pores being absent in the females; in these eight males the pores range from 16 to 25 a side, though on account of there being sometimes more on one side than on the other the total range is from 30 to 49. The average number of rows of conical tubercles is 12, the range being from 10 to 16, the most southerly specimen (Morogoro) having the lower number and the most northerly gecko (Tana River) the highest; East African *mabouia* apparently average less than Congo examples for Schmidt, with a series of 75 of these lizards, found a range of from 14 to 18 rows. All agree in possessing the typical number of 7 to 8 lamellae under the median digit. The chin shields are normal except in No. 49300, where the second pair are excluded from contact with the second labial by the interposition of two small scales, a condition already noted by Stejneger in the case of two Aldabra Island *mabouia*, which are in the collection of the National Museum.

HEMIDACTYLUS PERSIMILIS Barbour and Loveridge

*Hemidactylus persimilis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 140, pl. 4, figs. 1 and 3.

1 (U.S.N.M. 62827) Lumbo, Mozambique. (Loveridge) 1918.

This specimen is a female measuring 105 (50 + 55) mm.; it is a topotype but not a paratype.

HEMIDACTYLUS BROOKII Gray

*Hemidactylus brookii* Gray, 1844, Zool. Erebus and Terror, pl. 15, fig. 2; ("Australia, Borneo"); 1845, Cat. Lizards Brit. Mus., p. 153.—Boulenger, 1885 Cat. Lizards Brit. Mus., vol. 1, p. 128.

1 (U.S.N.M. 42175) Wadelai, Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42507) Gondokoro, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 63608) Mombasa, K. C. (Raven) 1920.

The lamellae on the underside of the median digits are somewhat less numerous, being only 4 or 5 even when the unpaired terminal lamella is counted; those of the first digits range from 3 to 4. Schmidt,[13] reporting on a large series of Congo geckos, found 4 to 6 for the inner digit and 6 to 9 (9 rare) for the median. The upper labials range from 7 to 9 and the lower from 6 to 8. In length from snout to vent these three geckos measure from 38 to 61 mm.; the tails have been reproduced in every case.

HEMIDACTYLUS RUSPOLII Boulenger

*Hemidactylus ruspolii* Boulenger, 1897, Ann. Mus. Civ. Genova, ser. 2, vol. 17 (37), p. 6, pl. 1, fig. 1 and 1*a–c*. (Lugh, Bardera, Magala Umberto Id., and Dolo, Southern Somaliland).

Male (U.S.N.M. 49374) ? Merelle River, K. C. (Heller) 1911–12.
Female (U.S.N.M. 49812) Marsabit Road, K. C. (Heller) 1911–12.

[13] Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, pp. 446–452.

The male has 10 upper labials on one side, while the range in the type series was from 8 to 9; apart from this both specimens are in agreement with the lengthy description based on 12 examples. The male measures 93 (48+45) mm.; the female is 50 mm. from snout to vent, but the tail is missing.

HEMIDACTYLUS TANGANICUS, new species

*Hemidactylus ruspolii* LOVERIDGE (not of Boulenger) part, 1920, Proc. Zool. Soc. London, p. 134.

In 1920 I referred an exceptionally large gecko from Duthumi to *H. ruspolii* Boulenger. Recently, in connection with the present paper, I have reexamined this gecko and compared it with the pair of undoubted *ruspolii* from northern Kenya Colony as well as with a specimen of *H. macropholis* Boulenger from Lugh, Somaliland, named and sent to me by Boulenger himself. I find that this gecko can not be identified with either species, though intermediate in several respects. Feeling confident that it represents an undescribed species, I propose to designate it as above. It is possible that the large male from Mbunyi, Kenya Colony, mentioned in the 1920 paper is also referable to this new species; the individual in question is, I believe, in the Nairobi Museum.

*Monotype.*—Museum of Comparative Zoölogy No. 18253, a female from Duthumi, Morogoro District, Tanganyika Territory; collected by A. Loveridge on September 20, 1916.

*Diagnosis.*—Distinguished from what is apparently its nearest ally *H. ruspolii* by (1) its greater size, which is twice that of the type of *ruspolii;* (2) a patch of uniform granules in the concavity of the forehead and similar patches in the loreal and supraocular regions, instead of having the whole head covered with large, juxtaposed, sharply keeled tubercles, as is the case in *ruspolii;* (3) the depth of the rostral is two-thirds its width instead of a little broader than deep as in *ruspolii;* (4) there are 20 longitudinal rows of greatly enlarged, strongly keeled tubercles across the body, instead of 14 to 16; (5) the very different appearance of the obtusely keeled conical tubercles as opposed to the elongate, sharply keeled and spinose caudal scales of *ruspolii.*

As there seemed just a possibility that it (*tanganicus*) might be identified with *barodanus* Boulenger, which is only known to me from the description, I took the liberty of sending the type of *tanganicus* to Mr. H. W. Parker, who has very kindly compared it with the type of *barodanus,* and points out the following differences: (1) Two lobules on anterior border of ear as against no auricular lobules in *barodanus.* (2) Concavity of upper surface of snout lined by small granules while those scales in the concavity of *barodanus* are not appreciably smaller than those on the snout. (3) Tubercles on the back and occiput are very much larger and more strongly keeled

than in *barodanus* where they are smaller and less strongly keeled. (4) No praeanal pores as against eight praeanal pores, but the types are of opposite sexes. (5) Free edges of lateral ventral scales markedly instead of slightly serrate. (6) Paired digital lamellae are as follows:

| | Fingers | | | | Toes | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | First | Third | Fourth | Fifth | First | Second | Third | Fourth | Fifth |
| *tanganicus* | 5 | 7 | 8 | 6 | 5 | 7 | 7 | 7 | 5 |
| *barodanus* | 6 | 8 | 9 | 8 | 5 | 8 | 8 | 9 | 8 |

After pointing out the similarity of the nasals, labials, and chinshields, and remarking that they are alike in general bodily proportions except that *tanganicus* is slightly larger, Mr. Parker continued:

I conclude that the two beasts are not conspecific. We have 10 other specimens of *H. barodanus* and all of them agree quite well with the type; none have the patch of small granules on the top of the snout and all have the smaller dorsal tubercles and the relatively longer fifth toe.

*Description.*—Head oviform; snout a trifle longer than the distance between the eye and the ear opening, one and three-quarters times the diameter of the orbit; forehead concave; ear opening vertically oval, its vertical diameter about half that of the orbit, two lobules projecting from its anterior edge. Body stout, limbs relatively short. Digits short, moderately dilated, free, the inner well developed, 5 lamellae under the inner digit, 7 under the third, 8 under the fourth, 6 under the fifth; there are 5 lamellae beneath the first and fifth toes and 7 under the three median ones. Canthal region with enlarged and sharply keeled tubercles gradually becoming smaller toward the loreal region, which is covered with granules; concavity of forehead lined with very small granules similar to those covering the crown and postorbital region but on both the latter areas are scattered numerous enlarged, conical, keeled tubercles; rostral rather tetragonal, its depth rather more than two-thirds its width, a median cleft above. Nostril pierced between the rostral and four scales with or without the first labial barely entering, 8 (right) or 9 (left) upper and 8 lower labials; symphysial large, triangular, twice as long as the adjacent labials; innermost pair of the two pairs of chin shields largest and in contact behind the symphysial. Upper parts with minute granules intermixed with very large, trihedral, strongly keeled tubercles forming 18 or 20 more or less regular longitudinal series, the largest tubercles a little broader than long; ventral scales small, smooth, roundish, imbricate; a more or less regular but interrupted line of enlarged round tubercles borders the belly laterally. Tail swollen,

carrot shaped, depressed above with transverse rows of large, rather flattened, though obtusely keeled conical tubercles in eight longitudinal rows, beneath with imbricate scales in about nine rows, of which the median is transversely enlarged. (See pl. 1.)

*Color in alcohol.*—Above, buff with a pinkish tinge, six dark blotches along the vertebral line between occiput and base of tail, a few similar blotches on the back and flanks; below, uniformly white with a tinge of pink.

*Measurements.*—Female: Total length, 157 mm.; length of head, 21 mm.; width of head, 17 mm.; snout to anus, 76 mm.; width of body, 22 mm.; length of tail, 81 mm.; width of tail at base, 18 mm.; length of fore limb, 22 mm.; length of hind limb, 23 mm.

#### HEMIDACTYLUS MACROPHOLIS Boulenger

*Hemidactylus macropholis* Boulenger, 1897, Ann. Mus. Civ. Genova, sec. 2, vol. 17 (37), p. 7, pl. 1, figs. 2 and 2*a–c*. (Dolo, Somaliland.)

Male (U.S.N.M. 49373) ? Merelle River, K. C. (Heller) 1911–12.

This three-quarters grown (53 mm. snout to vent, tail missing) male with 8 praeanal pores has been carefully compared with an exceptionally large male (M. C. Z. 18254) measuring 120 (60+80) mm. from Lugh in southern Somaliland and identified by Boulenger. Both agree in possessing 7 lamellae under the median digit; the two male cotypes from Dolo are said to have from 10 to 12. The Kenya gecko has 10 upper and 8 lower labials on either side; the Lugh specimen has $\frac{10-9}{7-6}$ while the cotypes had $\frac{9}{8}$. The Kenya gecko has an angular series of 8 praeanal pores, the one from Lugh only 6, but both within the acknowledged range of variation for the types had from 6 to 10.

The locality is quite in keeping with the known distribution of the species which has already been recorded from the rather arid regions to the north of the northern Guaso Nyiro.

#### HEMIDACTYLUS WERNERI WERNERI Tornier

*Hemidactylus bocagei* Tornier, 1897, Die Kriechthiere Deutsch-Ost-Afrikas, p. 12. (Dalalani, Tanganyika Territory.) Preoccupied name.
*Hemidactylus werneri* Tornier, 1897, Arch. Naturg., vol. 63, pt. 1, p. 63.
*Hemidactylus tornieri* Mocquard, 1902, Bull. Mus. Paris, p. 407.
*Hemidactylus squamulatus* Loveridge (not of Tornier), 1923, Proc. Zool. Soc. London, p. 939; 1928, Proc. U. S. Nat. Mus., vol. 73, p. 63.
*Hemidactylus citernii* Loveridge (not of Boulenger), 1923, Proc. Zool. Soc. London, p. 939.

2 (U.S.N.M. 76866–7) Hende, Dodoma District, T. T. (Loveridge), 1923.

I take this opportunity of clearing up the somewhat involved nomenclature of this species to which I contributed in 1923 by naming

some geckos in East Africa from the descriptions without comparative material.

In 1868 Cope described a gecko from Manila, Philippine Islands, as *H. longiceps*. It was later found to be a synonym of *H. frenatus* Duméril and Bibron.

In 1873 Bocage described *H. longicephalus* as a West African member of the genus.

In 1885 Boulenger, presumably on the grounds of the similarity of *longicephalus* to *longiceps*, proposed *H. bocagii* for Bocage's gecko. *H. longicephalus* must stand, however, as the name is not preoccupied.

In 1897 Tornier described *H. bocagei* for a gecko, whose scalation he says is very similar to that of *H. squamulatus*, which he described on page 10 of the same work. A few months later he renamed his *H. bocagei* as *H. werneri* on account of the preoccupation by the name Boulenger had proposed.

In 1902 Mocquard became aware of Tornier's duplication of the name *bocagii*, but presumably had not seen the later correction, for he again renamed *H. bocagei* Tornier, this time as *H. tornieri* Mocquard.

In 1913 Nieden relegated *squamulatus* to the synonymy of *tropidolepis* Mocquard, a species which is apparently closely related to *H. longicephalus* Bocage.

I must confess that when naming my specimens in East Africa with inadequate literature I got confused and since 1923 have been misapplying *H. squamulatus* Tornier to adults of *H. werneri* Tornier and *H. citernii* Boulenger to some very juvenile *H. werneri*. This means that *H. citernii* is still unknown from Tanganyika Territory, though my 1920 record of its occurrence at Nairobi, Kenya Colony is quite correct. The two geckos from Morogoro, which were identified as *H. squamulatus* Tornier in 1920, were correctly identified, but should be called *H. tropidolepis* Mocquard if Nieden is correct in considering that the two species should be united.

There are seven specimens of *H. werneri werneri* in the Museum of Comparative Zoology; they are from the following localities:

No. 18251, from Itende, Dodoma district, Tanganyika Territory.
No. 18252, from Mbala, Dodoma district, Tanganyika Territory.
No. 23041, from Dodoma, Dodoma district, Tanganyika Territory.
Nos. 18496–8, from Kilosa, Kilosa district, Tanganyika Territory.
No. 21933, from Kibwezi, Kenya Colony.

The last-mentioned lizard was received from the Berlin Museum identified as *H. werneri*. The first, as well as the two in the National Collection, were those previously considered *citernii* and are too small to be of much use. Four of the above series agree with the type in having 7 upper labials, and seven are in agreement in possessing 6 lower labials; the full range, however, is 6 to 8 upper and 6 or 7 lower. Two of the three males have 11 praeanal pores like the type; the third

has 17. Four agree with the type in having 6 pairs of lamellae under the median digit; the others have 4 and 7, respectively, and the three young are not considered.

I have employed the full name of *H. werneri werneri* on account of *H. alluaudi* Angel,[14] which is obviously so closely related as to be no more than a race, if, indeed, further specimens from Bura do not prove the species to have been founded on a solotype which was aberrant in its chin shields, for they alone seem to differentiate it from *H. werneri typica*. The author compared it with *H. tropidolepis* and *H. squamulatus*.

### Genus LYGODACTYLUS Gray

#### LYGODACTYLUS FISCHERI Boulenger

*Lygodactylus fischeri* Boulenger, 1890, Proc. Zool. Soc. London, p. 80, pl. 8, fig. 1.—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50 p. 143.

1 (U.S.N.M. 65913) Kasorongai River, K. C. (Mearns) 1911.

A very small example without a tail, but when compared with examples of *fischeri* from the Usambara Mountains it appears to be specifically identical.

#### LYGODACTYLUS GROTEI Sternfeld

*Lygodactylus grotei* Sternfield, 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 245.

1 (U.S.N.M. 63487) Lake Tanganyika, T. T. (Raven) 1920.

A well-preserved but tailless specimen, quite typical in its striking coloration as well as in its scalation.

#### LYGODACTYLUS PICTURATUS PICTURATUS (Peters)

*Hemidactylus picturatus* Peters, 1870, Monatsber. Akad. Wiss. Berlin, p. 115 (Zanzibar).

*Lygodactylus picturatus* Boulenger, 1885, Cat. Lizards Brit. Mus., vol. 1, p. 161.

2 (U.S.N.M. 48581–2) Mtoto Andei, K. C. (Heller) 1911.
6 (U.S.N.M. 49397–402) Kisumu, K. C. (Heller) 1911.
1 (U.S.N.M. 49811) Maji-ya-Chumvi. K. C. (Heller) 1911.
2 (U.S.N.M. 49447–8) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 63525) Victoria Falls, Zambezi. (Raven) 1920.

The gular markings on the Maji-ya-chumvi male approach those of *Lygodactylus manni*, but the head appears to be no shorter than in typical *picturatus*. The Maji-ya-chumvi and Mtoto Andei geckos are much smaller than topotypic examples from Zanzibar or the other adults in the above series. The male of the Mtoto Andei pair has, like *manni*, only 6 praeanal pores, while No. 49811 has 9. The Kisumu series appear to have been attacked by some parasite

[14] Angel, 1923, Bull. Mus. d'Hist. Nat. Paris, p. 490; 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912), pp. 8–11, text fig. 1.

in the praeanal region resulting in an eruptive appearance and clumping of the pores; despite this disorganization the series ranges from 7 to 9, except for one which has 11 pores obviously attributable to the diseased condition of the lizard.

LYGODACTYLUS PICTURATUS GUTTURALIS (Bocage)

*Hemidactylus gutturalis* Bocage, 1873, Jorn. Sci. Lisboa, vol. 4, p. 211. (Bissao Portuguese Guinea.)

*Lygodactylus gutturalis* Boulenger, 1885, Cat. Lizard Brit. Mus., vol. 1, p. 161. (Bissao cotype.)

*Lygodactylus picturatus gutturalis* Werner, 1907, Akad. Wiss. Wien (math. natur.), vol. 116, pt. 1, p. 1833.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 462. (Garamba, Congo.)

6 (U.S.N.M. 42511–6) Nimule Uganda. (Sm. Afr. Exped.) 1910.

No topotypic specimens of *gutturalis* are available for comparison, but a good series from the Congo, are similar in coloration and scalation though possibly more robust—perhaps a matter of preservation. The six Nimule geckos range from 27 to 35 mm., with an average of 31 mm.; five are males with a range of praeanal pores of from 7 to 8; upper labials 7 to 8; lower labials 5 to 7.

TARENTOLA EPHIPPIATA O'Shaughnessy

*Tarentola ephippiata* O'Shaughnessy, 1875, Ann. Mag. Nat. Hist., ser. 4, vol. 16, p. 263 (West Africa).—Boulenger, 1885, Cat. Lizards Brit. Mus., vol. 1, pp. 198, 414, pl. 16, fig. 1.—Anderson, 1898, Zool. Egypt, Rept. and Batr., p. 88, text fig.

1 (U.S.N.M. 42510) 40 miles n. of Nimule, U. (Heller) 1911.

This tailless and deviscerated adult with crushed head constitutes the first record for the occurrence of the genus in Uganda. The type was described from the West Coast but Boulenger has since recorded four examples from Shaik Hussein and Durro in western Somaliland. The Nimule gecko, measuring 75 mm. from snout to anus, has been compared with M. C. Z. 21948 from Yola, Cameroons and bears out Anderson's remarks as to the slightly longer snouts of East African specimens. This can best be shown in tabular form, thus:

| | Nimule | Yola | Times included |
|---|---|---|---|
| | *mm.* | *mm.* | |
| Length of snout from anterior border of eye | 9.5 | 7 | 1.357 |
| Distance between the eye and ear opening | 7 | 6.3 | 1.111 |

In both specimens the nostril is between the rostral, first labial, and three nasals, so that the generic description of this character given by Boulenger is wrong for both this and other species, Anderson states that the nostril is between the rostral, first labial, and two

nasals, which may well be the case with some examples, though not so with those before me. Nor do either of them bear out the alleged difference between West and East African geckos in the proportion of the height to the breadth of the nostril which is alike in both.

There are 15 lamellae under the first and fourth digits, as against 12 to 13 and 14 to 15, respectively, recorded for West African *ephippiata*. It may be that an East African race can be differentiated, but until we have more material, in view of the well-known variability of species of this genus, it appears advisable to exercise caution. In passing I might say that the chin shields of the Cameroon gecko are markedly different on the right and left sides. Both Boulenger and Anderson have noted azygous arrangements and subdivisions of the chin shields of this species.

## Family AGAMIDAE

### Genus AGAMA Daudin

The agamas of the *colonorum-planiceps-lionotus* group are badly in need of revision, but long series of topotypic material of some of the undermentioned races is necessary before anything like a satisfactory statement can be made as to the taxonomic position of some of these.

In studying the United States National Museum series from Kenya Colony, together with the material from Tanganyika Territory in the Museum of Comparative Zoölogy, I have been impressed with a number of facts which may tend to throw light upon the situation. When writing the Catalogue of Lizards in the British Museum in 1885 Boulenger sought to differentiate *colonorum* and *planiceps* as follows:

a'. Body moderately depressed; dorsal scales mucronate ..... colonorum.
b'. Body much depressed; dorsal scales not or but very slightly mucronate ..... planiceps.

A perusal of the full descriptions given shows them to be almost identical and that the essential differences are expressed in the key.

Andersson [15] has shown that the Linnean types of *Lacerta agama*, still in existence, can be identified with *Agama colonorum* and *Uraniscodon plica*. The name *agama* must replace *colonorum* on grounds of priority. Though the type locality was given as America the probability is that the two specimens of *Agama agama* (Linnaeus) came from West Africa, which is the headquarters of the species.

For convenience sake at first I attempted to treat *agama* and *planiceps* as distinct species, each with its several races, but on studying the material so much intergradation occurs between the races of the two groups that one was forced to the conclusion that the

[15] Andersson, 1900, Bih. Svenska Vet-Akad, Hand., vol. 26, p. 11.

presence or absence of a mucro is not a character of specific importance, but appears to be affected by the nature of the environment.

I suggest that typical West African *Agama agama agama* is mainly an arboreal lizard characterized by a less depressed body, exceedingly strongly keeled and mucronate scales, and a strongly raised ridge or keel to the tail. As this lizard extends eastward through the forest belt to Uganda, a reduction in the strength of the keels and mucros has taken place and the caudal keel is generally absent or so low as to be inconspicuous. Some name is probably available for the Central African form, but in this paper I am not distinguishing it from *forma typica*; at best it is only an intermediate between the western and eastern lizards.

I regard *A. a. planiceps* of Angola and south West Africa as the savannah representative of the typical forest *agama*; according to Boulenger the range of the typical form extends southward to Angola. Its southwestern race is characteristized by a more depressed body, strongly keeled scales, with or without a mucro, a caudal keel in the male. In 1919 Boulenger recorded its occurrence at Stanleyville, Belgian Congo; in 1900 Roux lists one from Uganda while Tornier in 1897 refers material from several localities in Tanganyika Territory to *planiceps*. In 1907 Lönnberg identified two lizards from the Meru steppe with this species. I think that these East African records are probably referable to some of the undermentioned races and are subspecifically distinct from the Angolan lizard.

In 1896 Boulenger described a lizard from southeast of Lake Rudolph as closely related to *planiceps* and named it *lionotus*, its close affinities can best be expressed by calling it *A. a. lionotus*. It was said to differ from *planiceps* in the larger spines on the side of the head and neck, which nearly equaled the tympanic diameter, and by the very feeble keeled dorsal scales. Incidentally the head is said to be as long as broad. I feel sure that there is some error in this statement. The life-size illustration shows the head longer than broad, as is the case with all agamas of this group. The size of the head and neck spines is a character of no significance among these races, varying much among individuals from the same locality. In the Museum of Comparative Zoölogy is an almost, or actual, topotype of *lionotus* from the Guaso Nyiro district of Kenya Colony. This male (M. C. Z. 8202), except for the slightly shorter spines on head and neck, agrees so closely with the figure, description, and coloring of the type that it leaves no doubt as to its identity. There is a female (M. C. Z. 7993) from the same locality and a male (M. C. Z. 8204) from the Ithanga hills also in the collection.

In 1897 Werner described four agamas collected by Schweinfurth as *A. flavicauda* but gave no locality. We know, however, that

Schweinfurth's travels led him through the Sudan to the northern Belgian Congo, and though in 1920[16] I considered that *A. caudospina* Meek was only a synonym of Werner's *A. a. flavicauda*, it would perhaps be more advisable to exclude *flavicauda* as an East African race until actual comparison of the types with East African *caudospina* has been made. There is nothing in the brief description of *flavicauda* to distinguish it from *caudospina* except, perhaps, the 7 to 8 praeanal pores and the statement that there are no occipitals, which seems rather doubtful.

In 1910 Meek described five male agamas from Gilgil and Lake Elementeita, Kenya Colony, as *A. caudospina*, characterized by 70–85 mid-body scale rows and an exceedingly depressed and spinose tail. On the base of the tail and adjacent area of the back characteristically there are a series of light transverse lines on a brownish ground. The throat in alcoholic specimens shows the dark longitudinal streaks which are present in males of most of the group.

In 1921 Lönnberg described *A. elgonis* from Mount Elgon on the basis of seven specimens of both sexes. He considered that it was probably a race of *lionotus* distinguished by the higher number of mid-body scale rows, 80–90, and the largest scales in the vicinity of the ear hardly more than half the diameter of the tympanum. The number of praeanal pores is 14. In life the head was coral red, the body and legs ultramarine blue. I consider that this race should be called *A. a. elgonis*.

In 1923 I described *A. lionotus dodomae* on the basis of a large series of lizards from the Dodoma Province of Tanganyika Territory. Boulenger, who personally examined the type, together with the type of *A. lionotus*, considered that the only character of importance—apart from coloring—distinguishing it from *lionotus* was the higher number of mid-body scale rows, 70–89. There are 10 to 13 praeanal pores. The male has a pearshaped scarlet patch on the throat which is surrounded by a rich navy-blue border. It should be called *A. a. dodomae*.

In 1923 *A. lionotus mwanzae* was described from Shanwa, Mwanza, Tanganyika Territory, from a series collected in the Mwanza Province. The males of this species are the handsomest of any of the races, being metallic purplish pink from snout to mid-body, while the posterior half of the body is rich metallic blue. Unfortunately in scale characters it is identical with the Dodoma race, possessing from 70–90 mid-body scale rows and 10 to 13 praeanal pores. It should be called *A. a. mwanzae*.

In 1928 Barbour and Loveridge described *A. colonorum usambarae* from the Usambara Mountains. It is the extreme eastern represent-

[16] Loveridge, 1920, Proc. Zool. Soc., London, p. 141.

ative of *A. agama agama* differing from the typical form in several respects recently discussed. The throat of the male is crimson-lake colored and faintly shows gray longitudinal lines. It is a species occupying recently deforested areas and now living upon rocks, though one was seen upon the trunk of a solitary tree.

The status of *A. doriae*, described from Abyssinia (Ethiopia) by Boulenger in 1885, is doubtful as far as East African records go. Nieden simplified matters by saying that all Tanganyika Territory records should be referred to *A. colonorum* (that is *A. agama*). Probably Lönnberg's records from Ngari na Nyuke and Nairobi Falls near Juja Farm are referable to another race. Boulenger in 1896 referred specimens from Lakes Rudolph and Stephanie to *doriae* but later united *doriae* with *hartmanni* of the Sudan. It is said to differ from *A. agama typica* in having the nostril pierced *below* instead of *on* the canthus rostralis. After examining the long series of males attributed to *A. agama agama* in the following pages I can not find one answering to this description, though there is a wide range of variation both in the size of the opening and its direction upward, outward, or backward. For the present it seems advisable to omit it from the fauna of British East Africa.

To sum up, it may be said that where open plains and low scattered rocky hills occur, both to the north and to the south of the equator, marked differentiation is taking place from the typical arboreal *A. a. agama*, mucros tend to disappear, keels on the scales become more obtuse, and the kopje-dwelling agamas have an appearance so like *planiceps* that many authors have referred East African captures to that race. One might compare the speciation that has been going on without the forest belt to that occurring in the squirrels of the genus *Heliosciurus* recently discussed by Major Ingoldby.[17]

Series taken from any one locality show a strong family likeness and the type or types of the species which I now propose to designate races, are, in most instances, of very distinct appearance. This applies chiefly to the adult males; younger males are more homogenous, while females in most cases are indistinguishable, in some races retaining their strongly keeled scales though those of the males are much smoother.

If the labeling is correct, Fort Hall appears to be the meeting place of three of the forms. It should be borne in mind that the topographical features in the immediate vicinity of Fort Hall are of the most diverse nature with wooded heights, thorny scrub, and rock-strewn valleys in close proximity.

[17] Ingoldby, 1927, Proc. Zool. Soc. London, p. 471.

### AGAMA AGAMA AGAMA (Linnaeus)

*Lacerta agama* Linnaeus, 1758, Syst. Nat., ed. 10, vol. 1, p. 207 (part "America.")
*Agama colonorum* Daudin, 1830, Hist. Nat. Rept., vol. 3, p. 356.—Boulenger, 1885, Cat. Liz. Brit. Mus., vol. 1, p. 356.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 717.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 469, pl. 18, fig. 2.
*Agama agama* Andersson, 1900, Bihang K. Svensk Vet-Akad. Hand., vol. 26, p. 11.

6 (U.S.N.M. 20081–6) Tana River, K. C. (Chanler) 1892.
2 (U.S.N.M. 37225–6) Northern Uganda. (Werner) N. D.
26 (U.S.N.M. 40915–8, 40920, 41132, 41358–9, 41907, 41910–25), Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41000, 41526) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
5 (U.S.N.M. 41631–5) Thika, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41932–3) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42178–9) Kampala, U. (Sm. Afr. Exped.) 1910.
7 (U.S.N.M. 42182–4, 42189–92) Kigoma, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42185, 42196) Hoima, U. (Sm. Afr. Exped.) 1910.
35 (U.S.N.M. 42197–208, 42210–14, 42233–49, 49369) East Africa. (Sm. Afr. Exped.) 1909–10.
3 (U.S.N.M. 42193, 42226–7) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
3 (U.S.N.M. 42508–9, 42519) Nimule, U. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 49293–4) Mt. Sagalla, K. C. (Heller) 1911.
1 (U.S.N.M. 61212) Budongo Forest, U. (Raven) 1920.
4 (U.S.N.M. 63447–50) Nabea, U. (Raven) 1920.

In this series are 64 males, ranging in length of head and body (the tails being mutilated) from 54 mm. to 132 mm.; the largest perfect male (63450) measures 303 (113+190) mm. Of the 37 females the smallest measures 96 (34+62) mm. and the largest (42206) 260 (100+160) mm. It is an unfortunate fact that the majority of these agamas, particularly the males, lose their tails; the older and larger the lizard the less likely it is to have a perfect caudal appendage.

As already mentioned, if we regard the agamas from the extreme west coast as typical of the species, then the males of this series are not entirely typical. They are characterized by strongly spinose and mucronate scales, even on the vertebral line, a moderate but distinct nuchal crest, a flattened but still rounded tail which lacks a dorsal keel. Praeanal pores in these males range from 9 to 16 with an average for 61 males of 11.7 pores. In young males (41365 for example) the mucro is sometimes indistinct but can be seen with a strong lens; in young females (41916, 41921, etc.) they may be so poorly developed as to be fairly considered lacking, Females do not differ appreciably from those referred to *A. a. lionotus* or paratype females of *A. a. usambarae* but do differ from a female *A. a. planiceps* (M. C. Z. 18276 from Pungo Andongo, Angola, identified by Boulenger) and females of *A. a. caudospina* in possessing mucros to most of the dorsal scales.

One adult male (42000) from Fort Hall is so strikingly like an *A. a. lionotus* (M. C. Z. 8202 from Guaso Nyiro, probably topotypic) in coloration and form, only differing in its stronger keeling and mucros, that one can not but feel the relationship of these forms is very close.

AGAMA AGAMA LIONOTUS (Boulenger)

*Agama lionotus* Boulenger, 1896, Proc. Zool. Soc. London, p. 214, pl. 8. (Southeast of Lake Rudolph, Kenya Colony ).—Loveridge, 1920, Proc. Zool. Soc. London, p. 141. (part, that is, Voi and Mbunyi, Kenya Colony; Longido, Tanganyika Territory).

*Agama colonorum* Meek (not of Daudin), 1910, Field Mus. Nat. Hist. Pub. 147, p. 407. (Voi; Lukenya; Kenya Province, Kenya Colony.)

40 (U.S.N.M. 40736–54, 41185–202, 41689–91) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
9 (U.S.N.M. 40788–91, 41498–500, 42005, 42505) Kapiti Plains, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41800–1) Pease's Farm, K. C. (Sm. Afr. Exped.) 1909.
13 (U.S.N.M. 41001, 41523–5, 41527–33, 41702, 42006) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41908) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42209) East Africa. (Sm. Afr. Exped.) 1909.
8 (U.S.N.M. 48572–9) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 49060) Guaso Nyiro, K. C. (Heller) 1911.
7 (U.S.N.M. 49191–7) Voi, K. C. (Heller) 1911.
2 (U.S.N.M. 49231–2) Mt. Lololokwi, K. C. (Heller) 1911.
1 (U.S.N.M. 49368) ? Merelle Water, K. C. (Heller) 1911.
2 (U.S.N.M. 66899–900) 10 miles s. of Lake Rudolph, K. C. (Mearns) 1911.
1 (U.S.N.M. 62850) Longido West, T. T. (Loveridge) 1916.

In this series are 48 males ranging in length of head and body (the tails being mutilated) from 76 to 132 mm.; the largest perfect male (41192) measures 325 (125+200) mm., and even this one has the tip of the tail lacking. Of the 37 females the smallest measures 101 (46+55) mm. and the largest 268 (104+164) mm.

In 1920, after Boulenger and I had compared them with his holotype of *lionotus*, and with his full concurrence, I referred certain agamas from Voi and elsewhere to *A. lionotus*. In applying that name to those of the present series it should be pointed out that while the majority are obtusely keeled and with mucros generally lacking from the scales—at least in the centre of the back—there are others which approach closely to those recorded as *A. a. agama*, but they have more points in common with *lionotus* than with *agama*. Perhaps some herpetologists would prefer to record them as intermediates.

The males in this series may be said to be characterized by the obtuse keeling of the dorsal scales which lack mucros at least in the middle 10 rows of the back, though exhibiting them on the flanks; nuchal crest low but well defined, more reduced than in the last series; a flattened but still rounded tail which lacks a dorsal keel. Praeanal

pores in these males range from 11 to 15, with an average for 45 males of 12.7 pores. As is the case with *A. a. agama*, while the pores are usually in a single series, occasionally a more or less developed second row appears, but these are not included in the counts.

One adult male (41908) from Fort Hall is so smooth that it compares well with paratype males of *A. a. usambarae*; in life, however, it probably had the red, or reddish orange, head of the *lionotus* race instead of the carmine one of the Usambara form. Writing from the Guaso Nyiro camp, Roosevelt speaks of "the bright blue-green lizards with orange heads." (African Game Trails, p. 315.)

AGAMA AGAMA CAUDOSPINA (Meek)

*Agama caudospina* Meek, 1910, Field Mus. Nat. Hist. Pub., vol. 7, p. 407 (Lake Elementeita, K. C., paratypes from Gilgil, Kenya Colony.)

*Agama flavicauda* Loveridge (possibly of Werner also which would then take priority), 1920, Proc. Zool. Soc. London, p. 141. (West of Mt. Kenya); 1923, Proc. Zool. Soc. London, p. 946. (Eldoret, K. C.).

*Agama lionotus* Lönnberg (not of Boulenger), 1922, Arkiv för Zoologi, vol. 14, p. 3. (Soy, K. C.)

*Agama planiceps* Angel (not of Peters), 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12), p. 12. (Naivasha and Mt. Kenya, K. C.)

2 (U.S.N.M. 40714–5) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40919) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41521–2) West side of Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42026) Sirgoit Lake, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42030) Kenya Colony. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 48570–1) Mtoto Andei, K. C. (Heller) 1911.
5 (U.S.N.M. 49099–103) Lukosa River, K. C. (Heller) 1911.

As already mentioned, I may or may not have been correct in 1920 in referring *caudospina* to the synonymy of *flavicauda;* until the types of *flavicauda* can be examined I prefer to adopt an attitude of caution and recognise *caudospina* as distinct. From Lönnberg's remarks as to the differences between his immature agama from Soy and typical *lionotus* it seems certain that it should be referred to *caudospina.* Angel's description of the coloration of his Naivasha lizard leaves no doubt that it is *caudospina;* he states that the two Mount Kenya specimens agree with it.

In the Smithsonian series are seven males, ranging from 99 to 123 mm. in length of head and body; the tails of all seven are mutilated. Of the seven females the smallest measures 196 (80+116) mm. and the largest uninjured is 277 (112+165) mm. It might be added that in the collection of the Museum of Comparative Zoölogy there are even larger examples of both sexes, a male (M. C. Z. 8201) from Guaso Nyiro is 132 mm. in body length, and a female (M. C. Z. 1798) from Loita Plains is 222 (100+122) mm. even with the tip of the tail lacking.

This is the best characterized of all the East African races of *Agama agama*. It is distinguished by the great development of the canine teeth in both upper and lower jaw, larger than in any of the other races; the greatly depressed and flattened tail whose breadth at the base is included in the body breadth from twice (old males) to two and one-third times (younger adults); the almost absent nuchal crest and the extremely faint keeling of the dorsal scales which appear almost smooth. The females of this species agree with the males in these characters and can thus be readily distinguished from the females of the preceding races.

The following additions or corrections to Meek's excellent description are worth recording: The nasal opening is usually on, but sometimes below (41522, 42030, 49099), the canthus rostralis; the narrow elongate scale on the middle of the snout is only present in 8 of the 14 specimens; in the others it is transversely divided or so reduced as to be indistinguishable from the surrounding scales; the occipital (and this point is of particular interest in connection with *flavicauda*), while generally noticeably enlarged, is sometimes the center of a group of scales almost equally enlarged; in other specimens portions of the occipital scale appear to have split off, thus reducing it in size until it is no bigger than adjacent scales (probably some such condition caused Werner to place his *flavicauda* in the third section of Boulenger's key (1885) instead of in the second; it then ran down to the Persian *Agama nupta*, the species with which he compares it); 9 to 11 upper labials with an average of 10; 9 to 11 lower labials with an average of 10; longest neck spines usually less than, but sometimes equal to half the diameter of the tympanum; lateral scales, more particularly in old males, with denticulated edges, sometimes six toothed; enlarged scales on the median-nuchal line sometimes very strongly keeled; 69 to 93 scales around mid-body (70 to 103 in the Museum of Comparative Zoölogy series); there is really no appreciable difference between the length of the third and fourth finger, though there is between the third and fourth toes as in the type; as stated by Angel, there may be a double row of praeanal pores, for No. 42026 has 11 in the anterior and 12 in the posterior row, while M. C. Z. No. 8200 has 2 in the anterior and 10 in the posterior (stranger still, an undoubted female (U.S.N.M. 40919). holding large eggs, has a row of 10 pores), omitting the supernumerary counts, 11 males (including M. C. Z. specimens) show a range of from 7 to 12, with an average of 10 praeanal pores.

From traces of color it may be said that the heads of males are red in life, their bodies blue. In alcohol both sexes have the throat light, vermiculated with the usual longitudinal dark lines; the sexes, however, may be distinguished in this series by every male being dark (blue ?) beneath, while each of the seven females is light yellow or white; the most characteristic feature of the coloring of this species

is the light, transverse, yellowish lines on the pelvic region as well as on the base of the tail; while the back is brown, shading to olive, with a small amount of yellow posteriorly, the latter color predominates on the tail, which may be said to be yellowish with irregular bands of brown, these bands varying much in distinctness.

The eggs in the Fort Hall female measure approximately 22 by 12 mm. This lizard has lost the right forearm at the shoulder but the stump is completely healed over and notwithstanding this mutilation the lizard has attained a large size—snout to vent 120 mm. The stomachs of two lizards were examined; they contained: (1) Ants and their imagines, a beetle, and a caterpillar; (2) ants and the flower heads of grasses. In the stomach of a Loita Plains specimen in the Museum of Comparative Zoölogy parasitic nematodes were found. These were identified as *Physaloptera* species and *Thelandros* species by Dr. Emmett W. Price of the Bureau of Animal Industry, United States Department of Agriculture, to whom my thanks are due. Specific determination was out of the question, as only a single specimen (U.S.N.M. 8074 and 8075) of each genus was present.

I am indebted to Dr. J. Bequaert for identifying a tick found on one of the Mtoto Andei specimens as *Amblyomma nuttallii* Don.

#### AGAMA AGAMA DODOMAE (Loveridge)

*Agama lionotus* var. *dodomae* Loveridge, 1923, Proc. Zool. Soc. London, p. 944 (Dodoma, Tanganyika Territory).

1 (U.S.N.M. 62851) Kongwa, T. T. (Loveridge) 1917.

It is purely on geographical grounds that I refer this very young agama to the Dodoma race, as it is not sufficiently developed for one to be sure of its appearance when adult. It only measures 109 (42+67) mm., and the sex is uncertain. Kongwa, where I collected it, lies about 40 miles northeast of Dodoma, and the topography and flora are essentially similar.

#### AGAMA HARTMANNI Peters

*Agama hartmanni* Peters, 1869, Monatsber. Akad. Wiss. Berlin, p. 65 (Dongola).—Boulenger, 1885, Cat. Liz. Brit. Mus., vol. 1, p. 340.—Anderson, 1898, Zool. Egypt, Rept. and Batr., vol. 1, p. 119.

2 (U.S.N.M. 61213–4) Rejaf, Sudan. (Raven) 1920.

Both are females with broken tails; one measuring 90 mm. in length from snout to vent is distended with eggs; the species, to judge from the stomach contents of one of these specimens, lives chiefly upon ants and beetles. Though I have no material for comparison, these two agamas agree so well with the original description that I entertain no doubts as to their correct determination.

### AGAMA VAILLANTI Boulenger

*Agama vaillanti* Boulenger, 1895, Ann. Mus. Civ. Genova, ser. 2, vol. 15, p. 12 (Ogaden, Somaliland).—Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, pt. 6, p. 11 (Thornbush north of Guaso Nyiro River, K. C.).—Loveridge, 1920, Proc. Zool. Soc. London, p. 142. (Voi and Mbunyi, K. C.).

2 (U.S.N.M. 49059, 49224) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 66901) Mount Nyero, K. C. (Mearns) 1911.
1 (U.S.N.M. 66927) between Ethiopia and K. C. (Mearns) 1912.

The series consists of two males and two females; the larger male measures 267 (93 + 174) mm.; unfortunately the tails of both females are missing, but in body length No. 66927 is 100 mm. The ova are small and undeveloped in both these females, of which the Nyiro agama was taken on July 13, 1912. The mid-body scale-rows of the type numbered 64 as is the case with 66927; the specimen obtained by the Swedish Expedition had 54 rows, thus agreeing with two of those in the present series; the fourth has 58, so that the range is from 54 to 64. Both males have 13 praeanal pores; one female has 9. These specimens have been compared with M. C. Z. No. 18281 from Voi, which I personally compared with the British museum type in 1920. The following additions to the original description may be made: Occipital scale occasionally only slightly larger than the adjacent scales; the spines are, generally speaking, as large as described, though in Lönnberg's young individual and in one of the females of the present series they are less developed; the scales on the vertebral line between the origin of the fore and hind limbs, which, in the type, numbered 27, range from 27 to 35 in the present series; the ventrals are smooth in only one female; in the others they have faintly indicated keels with or without a mucro; in no case does the adpressed hind limb reach the eye (as in the type); in the males it reaches to the tympanum; in the females only to the shoulder. In coloring they agree very closely with the type, excepting that the dorsal crossbars tend to form blotches in the males and are scarcely distinguishable or entirely wanting in the females.

Ants, beetles, a cricket, and remains of grasshoppers, together with a parasitic nematode (*Aplectana* sp.) [18] were present in the stomach of one of the specimens examined.

### AGAMA MOSSAMBICA MOSSAMBICA Peters

*Agama mossambica* Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 616 (Coastal Province of Mozambique).—Boulenger, 1885, Cat. Liz. Brit. Mus., vol. 1, p. 353.

*Agama mossambica mossambica* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 157.

5 (U.S.N.M. 62845–9) Morogoro, T. T. (Loveridge) 1916.

[18] Identified by Doctor Sandground.

The series consists of three juveniles and two adult males, of which the larger measures 418 mm. from snout to vent; the tail is damaged; these two males have 9 and 10 praeanal pores, respectively.

I am glad of the opportunity to reexamine these specimens, which I identified in the field in 1916 as *A. colonorum* [19] (=*A. agama agama*). The slight vertebral crest which forms a key character to *mossambica* is certainly present in the adults though scarcely distinguishable in young specimens.

AGAMA ATRICOLLIS Smith

*Agama atricollis* Smith, 1849, Illustr. Zoöl. S. Africa, vol. 3, Appendix, p. 14 (Natal, S. Africa).—Boulenger, 1885, Cat. Liz. Brit. Mus., vol. 1, p. 358.—Tornier, 1897, Kriechtiere Deutsch-Ost-Afrikas, p. 29.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 477, pl. 18, fig. 1 (bibliography and discussion).—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 153.

*Agama gregorii* Günther, 1894, Proc. Zool. Soc. London, p. 86. (Mkonumbi, Kenya Colony coast.)

3 (U.S.N.M. 40713, 40730–1) Guaso Nyiro River, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41515, 41707, 42020) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41909) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41360) Thika, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 42044, 42065–6) Kenya Colony or Uganda. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 42176–7) Kabulamuliro, U. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 42180–1) Kianuna, Entebbe, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42228) Kikonda, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 49086) Kisumu, K. C. (Sm. Afr. Exped.) 1909.
42 (U.S.N.M. 42104–45) Mount Sagalla, K. C. (Heller) 1911.
5 (U.S.N.M. 49204–6, 49394–5) Kaimosi, K. C. (Heller) 1912.
4 (U.S.N.M. 63444–6, 63485) Masindc, U. (Raven) 1920.
20 (U.S.N.M. 63451–70) Nabea, U. (Raven) 1920.
2 (U.S.N.M. 63471–2) Budongo Forest, U. (Raven) 1920.

This series, already referred to by Schmidt in the citation given above, consists of 62 males, ranging from 119 (53+66) mm. to 316 (134+182) mm., and 28 females ranging from 91 (34+57) mm. to 267 (118+149) mm. The disproportion in the sexes is to be accounted for by probable selection of the larger and handsomer males as they rest upon the tree trunks; it may well be that the females are more ready to take refuge when disturbed. The series corroborates Tornier's conclusions as to *A. gregorii* not being distinct; keeled or keelless ventrals occur more or less haphazardly and without any apparent reference to any particular geographical areas.

Two specimens had female oxyuroid nematode worms,[20] protruding from the anus.

[19] Loveridge, 1920, Proc. Zool. Soc. London, p. 140.
[20] Identified by Doctor Sandground.

## Family ZONURIDAE

### Genus CHAMAESAURA Schneider

#### CHAMAESAURA TENUIOR Günther

*Chamaesaura tenuior* Günther, 1895, Ann. Mag. Nat. Hist., ser. 6, vol. 15, p. 524, pl. 21, fig. B. (Kampala, Uganda.)
*Chamaesaura annectans* Boulenger, 1899, Proc. Zool. Soc. London, p. 97. (Ravine Station, Mau Mountains, Kenya Colony, at 7,500 feet.)

1 (U.S.N.M. 42482) Kenya Colony. (Sm. Afr. Exped.) 1909.
16 (U.S.N.M. 49035–47, 49072–4) Kaimosi, K. C. (Heller) 1912.

The series collected by Heller at Kaimosi, which is just east of the Kenya-Uganda border, is of extreme interest, as it enables us to unite these two East African species on precisely the same grounds as Hewitt [21] united two of the South African members of the genus in 1909, the action being confirmed by Boulenger [22] in 1910. The united species in that instance were:

*C. anguina* (Linnaeus) with monodactyle hind limbs and 26 mid-body scales.

*C. didactyla* Boulenger with didactyle hind limbs and 24 mid-body scales.

Both variations are distinguishable by their longer fore limbs from their equatorial representatives which provide the parallelism, namely:

*C. tenuior* Günther with monodactyle hind limbs and 24 mid-body scales.

*C. annectans* Boulenger with didactyle hind limbs and 26 mid-body scales.

In the Kaimosi series are monodactyle lizards with 24 and 26 mid-body scale rows as well as didactyle ones with 24 and 26 rows. The full range is, in fact, 22 (No. 49046 U.S.N.M.) to 26 (No. 49042 U.S.N.M., etc.), with a single specimen (No. 49045 U.S.N.M.) having 25. The longitudinal series of scales between occipital scale and anus range from 38 to 42. (Gunther gave 36 as between tympanum and vent which is about equivalent to 40 from occipital to vent.) Femoral pores range from 1 to 2. The coloration of the series is uniform and gives no grounds for supposing that we are dealing with two forms.

Naturally the possibility has been considered of these Kaimosi lizards being intermediates between a western and an eastern race as they come from a spot almost exactly halfway between the two type localities. This view, however, is not supported by the available records, for Boulenger himself has recorded *annectans* from Kabulamuliro, Uganda, and from Bugalla in the Sesse Islands to the

[21] Hewitt, 1909, Ann. Trans. Mus., p. 34.
[22] Boulenger, 1910, Ann. S. Afr. Mus., vol. 5, p. 470.

south or southwest of Kampala, while Nieden records *tenuior* from "German East Africa."

All the East African lizards of this group in the Museum of Comparative Zoölogy agree in possessing only 24 mid-body scale rows, though two of them are from the vicinity of the type locality of *annectans*, namely: 7982 Gilgil, Kenya Colony (didactyle), and 17982 Loita Plains, Mau Escarpment, Kenya Colony (didactyle); the others, which were already referred to *tenuior*, are 18288 Yala River, near Mount Elgon, Kenya Colony (monodactyle); 24798 Kitende, west of Moarara, Uganda (monodactyle).

The largest specimen, a female (No. 49039), measures 620 (136+484) mm., thus surpassing even the type which was 570 (114+456) mm. It will be observed that the body length is less than, or slightly more than, a third of the tail length, while in the 77 (25+52) mm. embryos in the uterus of No. 49039 the body length is almost exactly half that of the tail.

The viviparous nature of this species was noted by Tornier [23] as long ago as 1897 but little is known of their habits; there were six embryos in this large female while others in the series held large and developing ova.

## Family VARANIDAE

### Genus VARANUS Merrem

#### VARANUS OCELLATUS Rüppell

*Varanus ocellatus* Rüppell, 1827, Atlas Reise N. Afr., Reptiles, p. 21, pl. 6 (Kordofan).—Boulenger, 1885, Cat. Lizards Brit. Mus., vol. 2, p. 308.

1 (U.S.N.M. 49089) Mariakani, K. C. (Heller) 1911.

This specimen, of which the body is skinned out, measures 1140 (550+590) mm., but the extreme tip of the tail is lacking.

#### VARANUS NILOTICUS (Linnaeus)

*Lacerta nilotica* Linnaeus, 1766, Syst. Nat., ed. 12, p. 369.
*Varanus niloticus* Boulenger, 1885, Cat. Lizards Brit. Mus., vol. 2, p. 318.
*Varanus saurus* (Laurenti) Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 717.

2 (U.S.N.M. 20072–3) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 40914) Changamwe, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40998) Kenya Colony. (Sm. Afr. Exped.) 1909.
4 (U.S.N.M. 42156, 42231, 42257–8) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 49087–8) Kisumu, K. C. (Heller) 1912.
4 (U.S.N.M. 49093–5, 49151) Mazeras, K. C. (Heller) 1911.
1 (U.S.N.M. 63344) Lake Tanganyika, T. T. (Raven) 1920.

The last-mentioned specimen collected by H. C. Raven is by far the largest, as it measures 4 feet 8½ inches, or 1445 (590+855) mm.

[23] Tornier, 1897, Die Kriechthiere Deutsch-Ost-Afrikas, p. 37.

Numerous references are made in African Game Trails to this common African reptile, and facing page 432 are Loring's excellent photographs of a monitor robbing a crocodile's nest.

There was an abundance of animal life, big and little, about our camp.[24] In the reeds and among the water lilies of the bay there were crocodiles, monitor lizards 6 feet long, and many water birds * * *. (Roosevelt, p. 397.)

On one of these hunts, on which he shot a couple of buck, Kermit also killed a monitor lizard. (Roosevelt, p. 417.)

We did not find any crocodile's nest; but near camp, in digging a hole for the disposal of refuse, we came on a clutch of a dozen eggs of the monitor lizard. They were in sandy loam, 2½ feet beneath the surface, without the vestige of a burrow leading to them. When exposed to the sun, unlike the crocodile's eggs, they soon burst. Evidently the young are hatched in the cool earth and dig their way out. (Roosevelt, pp. 418–419.)

At the main camp we found that Mearns had made a fine collection of birds in our absence; while Loring had taken a variety of excellent photos of marabou, vultures, and kites feeding, and, above all, of a monitor lizard plundering the nest of a crocodile. The monitors were quite plentiful near camp. They are amphibious, carnivorous lizards of large size; they frequent the banks of the river, running well on the land, and sometimes even climbing trees, but taking to the water when alarmed. They feed on mice and rats, other lizards, eggs, and fish; the stomachs of those we caught generally contained fish, for they are expert swimmers. One morning Loring surprised a monitor which had just uncovered some crocodile eggs on a small, sandy beach. The eggs, about 30 in number, were buried in rather shallow fashion, so that the monitor readily uncovered them. The monitor had one of the eggs transversely in its mouth, and, head erect, was marching off with it. As soon as it saw Loring it dropped the egg and scuttled into the reeds; in a few minutes it returned, took another egg, and walked off into the bushes, where it broke the shell, swallowed the yolk, and at once returned to the nest for another egg. Loring took me out to see the feat repeated, replenishing the rifled nest with eggs taken from a crocodile the doctor had shot; and I was delighted to watch from our hiding place the big lizard as he cautiously approached, seized an egg, and then retired to cover with his booty. Kermit came on a monitor plundering a crocodile's nest at the top of a steep bank, while, funnily enough, a large crocodile lay asleep at the foot of the bank only a few yards distant. As soon as it saw Kermit the monitor dropped the egg it was carrying, ran up a slanting tree which overhung the river, and dropped into the water like a snake bird. (Roosevelt, pp. 431–432.)

## Family LACERTIDAE

### Genus NUCRAS Gray

#### NUCRAS EMINI Boulenger

*Nucras emini* Boulenger, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 488 (Lake Victoria, T. T.); 1920, Monogr. Lacert., vol. 1, p. 10.

2 (U.S.N.M. 42492–3) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.

Dr. J. A. Loring removed these somewhat damaged but full-grown lizards from the stomach of a secretary bird which may either have obtained them from the hills or more probably from the adjacent Athi Plains, in either case the locality is new though the species has

[24] Rhino Camp, to which the three following quotations also refer.

been recorded from the Loita Plains (misprinted in Monograph as Loika) and the Ulukenya specimens have been compared with a series in the Museum of Comparative Zoölogy (M.C.Z. Nos. 17984–9) collected on the Loita by Mr. C. P. Curtis in 1923.

### Genus LACERTA Linnaeus

#### LACERTA JACKSONI Boulenger

*Lacerta jacksoni* Boulenger, 1899, Proc. Zool. Soc. London, p. 96, pl. 10. (Mau Mountains, K. C.); 1920, Monogr. Lacert., vol. 1, p. 295.

1 (U.S.N.M. 49098) Lukosa River, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49288) Mt. Gargues, K. C. (Heller) 1911.
3 (U.S.N.M. 49377, 49454–5) Kenya Colony. (Heller) 1911.

The largest specimen (49454) measures 187 (73 + 114) mm. Angel [25] has shown that Lönnberg's race *kibonotensis* from Kilimanjaro can not be maintained. Mount Gargues is a new record for its distribution, and Heller's label states that it was obtained at the summit at 7,100 feet on August 27. Besides its occurrence on the Lukosa River (also called the Yala River), which is in the Kegamaia country at the foot of Mount Elgon, the species has been recorded from the Mount Ruwenzori, the Kivu Mountains, the Usambara Range, and in the remnants of rain forest on the outskirts of Nairobi.

### Genus ALGIROIDES Bibron

#### ALGIROIDES AFRICANUS Boulenger

*Algiroides africanus* Boulenger, 1906, Proc. Zool. Soc. London, vol. 2, p. 570, text fig. (Entebbe, Uganda); 1920, Monogr. Lacert., vol. 1, p. 348.

1 (U.S.N.M. 63419) Budongo Forest, U. (Raven) 1920.

This specimen measures 146 (53 + 93) mm. and constitutes the second record of its occurrence in Uganda though long series have been taken in the Congo and Cameroons.

#### ALGIROIDES ALLENI Barbour

*Algiroides alleni* Barbour, 1914, Proc. New Eng. Zool. Club, vol. 4, p. 97 (Northwestern slopes of Mt. Kenya, K. C.).—Boulenger, 1920, Monogr. Lacertid., vol. 1, p. 352.—Angel, 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12) p. 16, text fig. 11.

3 (U.S.N.M. 49410–2) Summit Aberdare Range, K. C. (Heller) 1911.

Angel has already recorded three of these lizards from Mount Kinangop in the Aberdare Range, and the variations and coloration which he has noted are also possessed by the specimens before me. One lizard has, however, four plates in its collar like the type, the other

[25] Angel, 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12) Paris, p. 14.

two possess five while Angel remarks that one of his had five and another six. The tails of all three are either wanting or reproduced.

### Genus PHILOCHORTUS Matschie

#### PHILOCHORTUS INTERMEDIUS Boulenger

*Latastia spinalis* Stejneger (not of Peters), 1893, Proc. U. S. Nat. Mus., vol. 16, p. 717.

*Philochortus intermedius* Boulenger, 1917, Proc. Zool. Soc. London, p. 152, pl. 2, figs. 2 and 3. (Berbera and vicinity, British Somaliland); 1921, Monog. Lacertidae, vol. 2, p. 9.

1 (U.S.N.M. 20076) Tana River, K. C. (Chanler) 1892.

The genus *Philochortus* was proposed in 1894 and includes *Lacerta spinalis* Peters. This Tana lizard, however, which I have compared with one of the Ghinda examples (M. C. Z. 21682) referred to by Boulenger on page 3 of his Monograph, differs from that Eritrean (not Ethiopian) species in a number of respects.

It agrees with the very detailed, 2-page description of *intermedius*, except that the interparietal is narrowly separated from the occipital, instead of being in contact; in possessing 11, instead of 12 to 18, femoral pores on either side; and in having 22, instead of 24 to 28 caudal scale rows in the fourth and fifth whorls behind the postanal granules. There are also minor color differences, the light bands being narrower in the Tana lizard. It measures 49 mm. from snout to vent; the tail is missing.

The distance between Berbera and the Tana is, of course, considerable, and it may be that if a large series from the Tana were available a southern race might be demonstrated. While this record adds a genus and species to the fauna of Kenya Colony it may be noted that though Boulenger cited the reference to Stejneger's paper on page 3 of the Monograph he did not extend the range of *P. spinalis* so as to include the record.

### Genus LATASTIA Bedriaga

#### LATASTIA LONGICAUDATA REVOILI (Vaillant)

*Eremias revoili* Vaillant, 1882, Miss. Revoil Pays Comal., Rept. p. 20, pl. 3, fig. 2. (Somaliland.)

*Latastia longicaudata revoili* Boulenger, 1921, Monogr. Lacert., vol. 2, p. 25.

1 (U.S.N.M. 48557) Mtoto Andei, K. C. (Heller) 1911.
3 (U.S.N.M. 49160–2) ? Sagalla, K. C. (Heller) 1911.

The largest of these well-preserved specimens measures 1,110 (85+250) mm. All are within the limits of variation in the range of scale characters given by Boulenger for this race.

## Genus EREMIAS Wiegmann

### EREMIAS SPEKII SPEKII Günther

*Eremias spekii* Günther, 1872, Ann. Mag. Nat. Hist., ser. 4, vol. 9, p. 381 (Unyamwezi, T. T.).—Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 84, pl. 4, fig. 2; 1921, Monogr. Lacert., vol. 2, p. 235.—Loveridge, Proc. Zool. Soc. London, 1920, p. 148; 1923, p. 953.

1 (U.S.N.M. 40934) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 48558–9) Mtoto Andei, K. C. (Heller) 1911.
7 (U.S.N.M. 49163–7) 49297–8) ? Mt. Sagalla, K. C. (Heller) 1911.

In referring these lizards to the typical form I mean that they have the subocular bordering the lip, and five dorsal lines of which the median bifurcates upon the neck as described in the Proceedings of the Zoological Society London, 1920 (p. 148). The Ulukenya lizard has these lines so faintly marked and the black markings so accentuated that superficially it presents a rather distinct appearance; it is, however, closely matched in these respects by a specimen of *Eremias spekii sextaeniata* (M. C. Z. 8175) from the Guaso Nyiro district of Kenya Colony which is part of a series of typically striped *sextaeniata*.

As far as I can judge, Boulenger is incorrect in saying that the typical form occurs in Uganda. I know of no records other than his "Ndi, Uganda," this should almost certainly be Ndi Station on the Uganda Railway, the station being close to Ndi in the Taita Hills and not far from Mount Sagalla. Much confusion has resulted from the calling of the railway which traverses Kenya Colony the "Uganda Railway;" no part of it entered Uganda until quite recently a branch line has been laid around the northern end of Lake Victoria.

### EREMIAS SPEKII SEXTAENIATA (Stejneger)

*Eremias sextaeniata* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 718 (Tana River, Kenya Colony).

*Eremias spekii sextaeniata* Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, No. 6, p. 15 (Northern Guaso Nyiro, Kenya Colony).

Paratype (20079) and type (20080) Tana River, K. C. (Chanler) 1892.
2 (U.S.N.M. 42521–22) Nimule, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 48560) Mtoto Andei, K. C. (Heller) 1911.
1 (U.S.N.M. 66903) Indunamara Mt., K. C. (Mearns) 1912.
1 (U.S.N.M. 66906) Tana River, K. C. (Mearns) 1912.

Boulenger, in his monographic revision of the Lacertidae in 1921, did not, though apparently with some hesitation, recognize *sextaeniata* as a race. It appears to me, however, from the table of records which he presents on page 239 of the second volume of the Monograph, as well as from Lönnberg's remarks in the reference cited above, which curiously enough escaped tabulation in the Monograph, that we are justified in recognizing *sextaeniata* as a northern race which meets with the "parent" form on, or about, a line corresponding approximately to the Uganda Railway in Kenya Colony. The two forms meet at Mtoto Andei (a station on the railway) for

one of the three specimens collected by Heller is typical *sextaeniata* both in the character of its subocular as well as in its color pattern, the other two are typical *spekii*. They meet again at Takaungu (not Takanugu as printed in the Monograph) which is just north of Mombasa for Boulenger records one from that locality with the subocular excluded from the lip in a series of 16 specimens of which 15 are typical in having the subocular reaching to the lip. North of these points, however, the *sextaeniata* type prevails all the way to Berbera in Somaliland with an increasing number of light lines on the back reaching a maximum of nine which Boulenger regards as the primitive form.

Of the 200 specimens which I have collected in Tanganyika Territory, only 4 had the subocular excluded from the lip, but they were typically *spekii* in coloration and pattern and in other respects did not differ from a hundred and forty six taken at the same place the same day.[26]

EREMIAS SMITHII Boulenger

*Eremias brenneri* Stejneger (not of Peters), 1893, Proc. U. S. Nat. Mus., vol. 16, p. 719.

*Eremias smithii* Boulenger, 1895, Proc. Zool. Soc. London, p. 534, pl. 29, fig. 4 (Milmil in Haud, Western Somaliland).

1 (U.S.N.M. 20078) Tana River, K. C. (Chanler) 1892.

This lizard, measuring 47 mm. from snout to vent (tail lost), is in a very poor state of preservation but fortunately the essential key characters are indisputably clear though injuries in the mid-body region prevent an exact count of the scale rows. The upper head shields are rugose or pitted but not striated; it has more than 68 smooth (not keeled) scales across the back and the upper caudal scales are strongly keeled.

This determination is also more consistent with the known distribution of the two species for *smithii* has already been recorded from the Northern Guaso Nyiro.[27] *Eremias brenneri* must be removed from the list of lizards known from Kenya Colony.

EREMIAS STRIATA (Peters)

*Eremias brenneri* var. *strialus* Peters, 1874, Monatsber. Akad. Wiss. Berlin, p. 370 (Brava, Somaliland).

*Eremias hoehneli* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 719 (Tana River, Kenya Colony).

*Eremias striata* Boulenger, 1921, Monogr. Lacertidae, vol. 2, p. 251.

1 (U.S.N.M. 20077) Tana River, K. C. (Chanler) 1892.

I have not examined this, the monotype on which *Eremias hoehneli* was based, so follow Boulenger, who, as latest reviewer, considering that it represents an individual anomaly, has referred it to the synonymy of *striata*.

[26] See Loveridge, 1923, Proc. Zool. Soc. London, pp. 953–954.

[27] Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 15.

## Family GERRHOSAURIDAE

### Genus GERRHOSAURUS Wiegmann

#### GERRHOSAURUS MAJOR Duméril

*Gerrhosaurus major* Duméril, 1851, Cat. méthod. coll. Rept., Paris, p. 139. (Zanzibar).—Boulenger, 1887, Cat. Liz. Brit. Mus., vol. 3, p. 121.—Loveridge, 1920, Proc. Zool. Soc. London, p. 149; and 1923, p. 954.

*Gerrhosaurus bergi* Werner, 1906, Zool. Anz., vol. 30, p. 54, text figs. 1–3 (Usambara Mtns. Tanganyika Territory).—Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 15 (Northern Guaso Nyiro, K. C.).

2 (U.S.N.M. 40928–9) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49146) Mazeras, K. C. (Heller) 1911.
4 (U.S.N.M. 49287–90) ? Mt. Sagalla, K. C. (Heller) 1911.
3 (U.S.N.M. 49305–7) Maji-ya-Chumvi, K. C. (Heller) 1911.
3 (U.S.N.M. 49308–9, 49442) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 49367) Merelle River, K. C. (Heller) 1911.

None of these lizards attain such large dimensions as those which I recorded in 1920 for a Mozambique specimen. They illustrate well the fictitious nature of the value which has been placed upon the character of whether the frontonasal is undivided (*major*) or divided (*bergi*). All stages in this division are shown, even in the small series from Maji-ya-chumvi where undivided (49307), semidivided (49305), and completely divided (49306) conditions are represented; entire division has taken place in 10 out of these 13 lizards. Nieden[28] has already referred *bergi* to the synonymy of *major*. All are normal in possessing 10 longitudinal series of ventral plates, and all, except No. 49288 which has 15, are within the range of variation in having from 11 to 14 femoral pores, the exception has 14 on the right leg.

The above series present the typical uniform nut-brown, or reddish brown, dorsal coloring and are white, or white tinged with pink, below. There is, however, a further specimen—

1 (U.S.N.M. 42216) Kenya Colony. (Sm. Afr. Exped.) 1909.

which is darker brown spotted with yellow precisely like the type of Tornier's[29] *Gerrhosaurus major zechi* from Kete Kratje, Togoland. This race was based on two young specimens, the total length of the larger being 273 mm. Later Schmidt[30] raised the form to specific rank, queried whether *G. bottegoi* Del Prato from Eritrea was not a synonym, and listed three specimens from Garamba, Belgian Congo, of which the largest was 455 mm. I do not see how *zechi* can be a subspecies of *major* for the geographical distribution of the two forms lends no support to the view. Both occur together at Morogoro and as one travels due west on the Central Railway of Tanganyika *major* is met with at Kilosa, *zechi* at Dodoma and *major* again at Ulugu and Luguo which are just north of Tabora.

[28] Nieden, 1913, Mitt. Zool. Mus. Berlin, vol. 7, p. 79.
[29] Tornier, 1901, Arch. Naturg., vol. 67, p. 74, text fig. 1.
[30] Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 519, text fig. 21.

Admittedly, the two lizards present a strikingly different appearance as regards color, but it hardly seems advisable to recognize reptiles as full species without anything more tangible than a color pattern to distinguish them. On the other hand, it would be premature to place *zechi* in the synonymy of *major* and it seems advisable to leave its present status uncertain until we are in possession of more adequate series and distributional data.

In passing it might be remarked that while the Kenya lizard (U.S.N.M. 42216) might be matched in its belly coloring by typical *major*, the Dodoma reptile (M.C.Z. 18313) has a dusky belly with light lateral lines precisely similar to a Transvaal specimen of *G. grandis* in the Museum of Comparative Zoölogy. This species, which Boulenger described from a Zululand example, is distinguished by possessing two scale rows more than *G. major* has across the back. The dorsal coloring of the Dodoma lizard is also intermediate between that of the Kenya and the Transvaal reptiles for in the latter the "yellow spots," such as one finds in typical *zechi*, have so spread over the scales as to eliminate the brown in extensive areas.

GERRHOSAURUS FLAVIGULARIS FLAVIGULARIS Wiegmann

*Gerrhosaurus flavigularis* Wiegmann, 1828, Isis, p. 379 ("Africa merid. Krebs").—Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 122.—Loveridge, 1920, Proc. Zool. Soc. London, p. 150.

*Gerrhosaurus flavigularis flavigularis* Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 519.

*Gerrhosaurus nigrolineatus* Authors and Loveridge (not of Hallowell) 1920, Proc. Zool. Soc. London, p. 150; and 1923, p. 955.

1 (U.S.N.M. 41014) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41711, 42022, 42040) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 49092, 49148–9) Mazeras, K. C. (Heller) 1911.
3 (U.S.N.M. 49179–80, 49226) Voi, K. C. (Heller) 1911.
2 (U.S.N.M. 49291–2) Mount Sagalla, K. C. (Heller) 1911.
1 (U.S.N.M. 63016) Ottoshoop, Transvaal. (Raven) 1919.

The examples in this series provide interesting data for the settlement of the problem as to whether *G. f. nigrolineatus* of West Africa does really occur in the east of the continent. In both the Mazeras and Sagalla series are examples of these lizards with smooth and also with keeled lateral scales; obviously the character can not hold any diagnostic value and I revert to my former opinion that Schmidt's grouping of the eastern and western forms according to the average number of scales across the back in the mid-body region is by far the most satisfactory definition. Five of these specimens have 20, one has 21, and seven have 22 such scale rows. On this character they are immediately distinguishable from Congo and Angolan *G. f. nigrolineatus*, where the range is from 24 to 28. The vagaries of the praefrontals are well illustrated in this series, where they are in con-

tact in 8 specimens, separated in 1 (No. 49148) and intermediate in 3, which come from Nairobi, Mazeras, and Sagalla.

The largest specimen (49148) measures 495 (144+350) mm.

## Family SCINCIDAE

### Genus MABUYA Fitzinger

#### MABUYA COMORENSIS (Peters)

*Euprepes comorensis* Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 619; (Anjoana, Comoro Ids.); 1882, Reise nach Mossamb., vol. 3, p. 72, pl. 10, fig. 3.

*Mabuya comorensis* Boulenger, 1887, Cat. Liz. Brit. Mus., vol. 3, p. 163.—Loveridge, 1923, Proc. Zool. Soc. London, p. 956.

*Mabuya comorensis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 156.

1 (U.S.N.M. 49147) Mazeras, K. C. (Heller) 1911.

This skink is specifically identical with what I have been calling *comorensis* hitherto. In body length it is larger than any of the series of *maculilabris* listed below, being 230 (91+139) mm.; it also differs from them in possessing 36 scale rows (though we know that true Cameroon *maculilabris* have 33 to 36 scale rows, while East African examples more usually have 30); the dorsals are septemcarinate and it has 5 supraciliaries; its praefrontals are separated and the anterior loreal is excluded from contact with the first labial.

#### MABUYA MACULILABRIS (Gray)

*Euprepis maculilabris* Gray, 1845, Cat. Liz. Brit. Mus., p. 144 (West Africa).

*Mabuia maculilabris* Boulenger, 1887, Cat. Liz. Brit. Mus., vol. 3, p. 164.

*Mabuya maculilabris* Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 525, map 17.—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 157.

1 (U.S.N.M. 42154) Kampala, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42195) Hoima, U. (Sm. Afr. Exped.) 1910.
3 (U.S.N.M. 42229, 42251–2) Rhino Camp, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 49203) Kaimosi, K. C. (Heller) 1911.
1 (U.S.N.M. 63421) Masindi, U. (Raven) 1920.
2 (U.S.N.M. 63422–3) Nabea, U. (Raven) 1920.
3 (U.S.N.M. 63476–8) Uganda. (Raven) 1920.

These are only tentatively referred to *maculilabris*, for it occurs to me that they are more nearly related to *comorensis* than to *maculilabris*, at the same time they are undoubtedly identical with what Boulenger called *maculilabris* from Ruwenzori, for they have been compared with one of his series from that mountain; with the exception of the Kampala skink they are apparently the same as Stenfeld's *M. maculilabris major* from the Central Lake region and agree with specimens in the Museum of Comparative Zoology from Mutea on the White Nile; Rutshuru and Bumba, Belgian Congo, and Sao

Thome Island, West Africa. I hope shortly to have the opportunity of examining the type of *maculilabris* and topotypic specimens of *comorensis;* until this is done the identification had better stand. The largest specimen measures 261 (85+176) mm.; in body length, however, it is surpassed by the 90 mm. Kaimosi skink, whose tail is damaged; the range in body length is from 72 to 90 mm.; scale rows 30 to 34, with dorsals possessing from 5 to 7 keels; supraciliaries number from 4 to 6, the same skink often possessing an azygous arrangement while others are normal, thus No. 63422 has 6 and 4, No. 63476 has 4 and 5, No. 42154 has 5 and 6, No. 63421 has 4 and 4, No. 63423 has 5 and 5, No. 49203 has 6 and 6; four skinks have the praefrontals broadly in contact; four have them barely in contact; in two they are well separated; the anterior loreal is usually in contact with the first, second, and third labials though in a few specimens it is separated from the first, still more rarely from the third.

I have examined three other lizards in the National Collection which possess only three keels to their scales; these are:

1 (U.S.N.M. 20810) Leopoldville, B. C.
1 (U.S.N.M. 62125) Fernandez Vaz, French Congo.
1 (U.S.N.M. 63362) Kindu, B. C.

In this respect they agree with M. C. Z. 24812 taken on board a steamer near Lulonga, B. C., and referred by Barbour and Loveridge to *maculilabris*. It might be remarked that they have not the coloring of *raddonii* (type locality, "West Africa") as shown by a fine series from Liberia in the Museum of Comparative Zoölogy, though the white lateral line is present in the Kindu and Lulonga specimens. It is idle for me to speculate as to their status until larger series of West African and Congolese *raddonii* and *maculilabris* are available for study.

MABUYA BREVICOLLIS (Wiegmann)

*Euprepes brevicollis* Wiegmann, 1837, Arch. fur Natur., p. 133.
*Mabuia brevicollis* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 169 (Aschik Id., Red Sea: Wonber Harattib, Ethiopia).—Anderson, 1896, Herb. Arabia, p. 47 (Arabian localities).—Meek, 1910, Field Mus. Nat. Hist. Publ. 147, vol. 7, p. 410 (Voi; Athi; Lukenya, K. C.).—Loveridge, 1920, Proc. Zool. Soc. London, p. 152 (Kagiado, K. C.; Mount Longido, T. T.).
*Mabuya chanleri* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 721 (Tana River, K. C.).

1 (U.S.N.M. 20104) Tana River, K. C. (Chanler) 1892. Type of *M. chanleri*.
1 (U.S.N.M. 40930) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41976) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 49155, 49223, 49225) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 49220) Mt. Lololokwi, K. C. (Heller) 1911.

Omitting the type of *Mabuya chanleri*, which I have not seen, the remaining six specimens have been compared with those from Kagiado

and Mount Longido mentioned in the bibliography, also with another skink (M. C. Z. 18323) which I collected at Shaik Othmann, Arabia, in 1919.

The largest specimen measures 337 (147 + 190) mm., though the tip of the tail is missing; apparently it is a female; a male has the throat and sides of the head deep black; the sides of the head are flecked with white, also resulting in a very striking appearance; otherwise all are typically marked, none present the handsome vertical striping on the sides which is so pronounced in the Kagiado and Longido skinks. Both Anderson and Meek have interesting notes on these and other color variations.

In this series (still omitting the type of *chanleri*) the following variations may be noted. The postnasal sometimes rests on the first upper labial only; in three specimens the supranasals are separated by the rostral being in contact with the frontonasal; the first supraocular is sometimes narrowly separated from the frontal; the nuchals are more or less distinctly keeled; in Nos. 49220 and 49223 the subocular is between the sixth and seventh upper labials though normal—that is, between fifth and sixth—in the rest of the series; 1 to 3 ear lobules; dorsals only bicarinate in No. 41976 though showing a tendency to lose the middle keel in No. 40930; all the other skinks have three keels; mid-body scale rows 31 to 38, Boulenger gives 30 to 32, Anderson 32 to 34 for Arabian specimens; it should be noted, however, that only one specimen (No. 40930) has 38; after carefully checking and rechecking this count I could find no other differences between this specimen and the rest of the series, which possess 31, 32, 32, 32, and 34 scale rows.

The most important variation noted is that the soles of the young bear spinose scales whose spinosity decreases with age so that the young do not fall into the right key in the Catalogue of Lizards; as a result of this *M. chanleri* came to be described. It has been a particular pleasure to me to examine this series, for now that I have seen these large examples I can say, speaking from memory, though without any doubts, that the large skink in the Nairobi Museum without locality and identified by Boulenger in 1914 as *homalocephala* is undoubtedly a *brevicollis*. It is easy to see how the slip was made if the key in the Catalogue of Lizards was relied on alone for if one considers its "ear lobules long" instead of short it falls into the wrong section of the key and naturally falls to *homalocephala*. I have only recently seen specimens of *homalocephala* (M. C. Z. 24449–50) from Zululand, and it is an entirely different skink from that so labeled in the Nairobi Museum and reference to which has twice been made in check lists that I have published. In removing it from the lists of reptiles for the region under consideration we remove an anomaly in distribution.

MABUYA MEGALURA (Peters)

*Euprepes (Mabuia) megalura* Peters, 1878, Monatsber. Akad. Wiss. Berlin, p. 204, pl. 2, fig. 4 (Taita, K. C.).

*Mabuia megalura* Boulenger, 1877, Cat. Lizards Brit. Mus., vol. 3, p. 195.—Loveridge, 1920, Proc. Zool. Soc. London, p. 152.

1 (U.S.N.M. 40927) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 40965, 42999, 43073) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42942, 63067) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
4 (U.S.N.M. 49066–8, 49199) Kaimosi, K. C. (Heller) 1911.
3 (U.S.N.M. 49050–2) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 65914) Kasorongai River, K. C. (Sm. Afr. Exped.) 1909.

The largest male (No. 49067) measures 185 (53+132) mm.; the biggest female (No. 49066) is 224 (69+155) mm., but both are surpassed by specimens which I recorded in 1920. In scutellation this species is one of the least variable of skinks, the mid-body scale rows given by Boulenger as 24 to 26 are 25 to 27 in the present series; only two have 25 rows and one has 27, all three of these variable ones being from Nairobi.

MABUYA QUINQUETAENIATA (Lichtenstein)

*Scincus quinquetaeniata* Lichtenstein, 1823, Verz. Doubl. Mus. Berlin, p. 103 (Egypt and Nubia).

*Mabuia quinquetaeniata* Boulenger, 1889, Cat. Lizards Brit. Mus., vol. 3, p. 198 (Arabia to Mozambique and West Coast localities).—Loveridge, 1920, Proc. Zool. Soc. London, p. 153 (Dodoma, T. T.).

*Mabuia obsti* Werner, 1913, Mitt. Nat. Mus. Hamb., vol. 30, p. 43 (Kwa Mtoro, Dodoma Province, T. T.).—Loveridge, 1923, Proc. Zool. Soc. London, p. 960 (Kisumu, K. C.).

*Mabuia quinquetaeniata hildebrandtii* Sternfeld, 1917, Rept. and Amph. in Ergeb. Deut. Zentr.-Afr. Exped. 1910–11, vol. 1, p. 438, pl. 24, fig. 3 (Taita, Kenya Colony).

*Mabuya quinquetaeniata* Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 545, pl. 27, figs. 1 and 2, map 19 (Congo localities).

3 (U.S.N.M. 42217–9) Kenya Colony. (Sm. Afr. Exped.) 1909.
5 (U.S.N.M. 42484–5, 42523–4, 43096) Nimule, U. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 48580–1) Mtoto Andei, K. C. (Heller) 1911.
2 (U.S.N.M. 49057–8) ? Guaso Nyiro, K. C. (Heller) 1911.
7 (U.S.N.M. 49152–4, 49168–9, 49295–6) ? Mount Sagalla, K. C. (Heller) 1911.
9 (U.S.N.M. 49182–90) Voi, K. C. (Heller) 1911.
1 (U.S.N.M. 49229) Mount Lololokwi, K. C. (Heller) 1911.
3 (U.S.N.M. 49370–2) ? Merelle River, K. C. (Heller) 1911.
1 (U.S.N.M. 63361) Victoria Nyanza. (Raven) 1920.
1 (U.S.N.M. 66902) Indunamara Mt., Nyiro Mtns., K. C. (Mearns) 1912.
1 (U.S.N.M. 66904) Malele, K. C. (Mearns) 1912.

For excellent illustrations of the very different appearance of adult examples of the two sexes, the reader is referred to Schmidt's

report on the Lang and Chapin Congo collections, also for detailed notes on variation based on a series of 130 specimens. Schmidt says that while the majority of females remain striped, occasional specimens adopt the male coloring. Owing to the devisceration of many specimens by the field collectors in both this and other series it is not always easy to be sure of the sex; in the following remarks, therefore, I have had to assume that all specimens lacking stripes and with the vertical barring on the sides of the neck are males and striped skinks are either females or young males.

The largest male (No. 49169) measures 241 (104+137) mm.; the largest female (No. 40153) 206 (85+121) mm.

While the soles of the feet are usually not spinose, very occasionally—10 per cent of the present series—the soles are markedly spinose. In applying Boulenger's key in the Catalogue of Lizards to the latter they are thrown out of the *quinquetaeniata* section into the *striata-varia* group. I presume that something of the kind occurred when Werner described *M. obsti*, for though he does not actually state that the soles of its feet are spinose he compares his specimens throughout with *M. striata*. His material consisted of five adults and two young; though the spinosity is chiefly a juvenile character, it is well marked in specimens in the present series (No. 66902, for example) even larger than Werner's largest female, which was 145 (65+80) mm.; his biggest male, which was 165 (60+105) mm., is well under the dimensions when males assume their fully adult livery; this occurs when they are about 215 (85+130) mm. Having collected such males at Dodoma and seen females at many places in Dodoma Province, I have no hesitation in referring *obsti* to the synonymy of *quinquetaeniata*. Unfortunately the types of *obsti* have been lost, both those that were returned to the Hamburg Museum and the specimen or specimens retained by Doctor Werner. In 1924 and again in 1929 both parties were approached and endeavors made to trace the types but without success.

Sternfeld's *M. quinquetaeniata hildebrandtii* was based on three badly preserved males from Taita which had from 44 to 46 midbody scale rows. Anderson gives 35 to 42 for Egyptian (therefore topotypic) *quinquetaeniata*. In the present series I find from 38 to 46, with a probable average of 44, for only half the series have been counted. The lowest number, 34 (Mount Lololokwi), 38 (Guaso Nyiro), 40 (Indunamara Mtn.) 42 to 46 (Voi), 44 to 46 (Sagalla), this last locality being near Taita. It is obvious that there is a tendency for an increase of scale rows as one proceeds southwards, but everywhere the overlapping is considerable. Schmidt gives 36 to 41 for the Congo. Peters records 42 to 44 in his description of *margaritifer* from Tette, Mozambique. If a southerly race must be

named *margaritifer* would take precedence over *hildebrandtii*, which can not stand under any circumstances, being preoccupied by *Mabuya hildebrandtii* (Peters), which I consider a synonym of *M. varia*. Sternfeld mentions that there are 4 upper labials anterior to the subocular; this is, however, normal for typica and, after eliminating three damaged specimens, is constant for the whole of the present series except No. 49168, which has 3 (right) and 4 (left) and No. 49188, which has 4 (right) and 5 (left). There is nothing unusual in the Taita skinks having 6 or 7 supraciliaries for division and fusion of these scales is common, those of the present series examined (about half) have 5 or 6.

MABUYA BAYONII Bocage

*Mabuia bayonii* Bocage, 1872, Jorn. Sci. Lisboa, vol. 4, p. 75 (Duque de Bragança, Angola).—Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 201 (Angola and Mossamedes).—Tornier, 1897, Die Kriechthiere Deutsch-Ost-Afrikas, p. 42 (Ssero on border of K. C. and T. T.).—Nieden, 1913, Mitt. Zool. Mus. Berlin, vol. 7, p. 86 (Ssero; Ngurumann, Lake Victoria, T. T.).

1 (U.S.N.M. 40710) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40781) Wambugu, K. C. (Sm. Afr. Exped.) 1929.
4 (U.S.N.M. 40947–50) Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42024) Sirgoit Lake, K. C. (Sm. Afr. Exped.) 1909.

This series of skinks, so similar in general appearance to *M. varia*, is characterized by (1) the scales on the soles of the feet being non-spinose; (2) the subocular being much narrowed inferiorly and (actually excluded from the lip on the left side in No. 40781) with five labials anterior to it; (3) single frontoparietal; (4) 34 to 36 mid-body scale rows with dorsals tricarinate; (5) two or three very long ear lobules. The identification had already been made at the National Museum and I can only confirm it. From a geographical point of view these fresh records are astonishing; one would have expected these skinks to be referable to *isselii* of Ethiopa rather than with the Angolan *bayonii*, but while they agree with *isselii* (which I made a synonym of *varia* in 1920) in the single frontoparietal they differ in possessing smooth scales, much narrowed subocular and long ear lobules.

The species is apparently larger than *varia*, of which perhaps it might be considered a race; in length from snout to vent these specimens range from 60 to 77 mm., the last mentioned skink (No. 40950) measuring 171 (77 + 94) mm. over all.

MABUYA VARIA (Peters)

*Euprepes* (*Euprepis*) *varius* Peters, 1867, Monatsber. Akad. Wiss. Berlin, p. 20 (Tette, Mozambique).

*Mabuia varia* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 202.—Loveridge, 1923, Proc. Zool. Soc. London, p. 958.

1 (U.S.N.M. 40694) Meru, K. C. (Sm. Afr. Exped.) 1909.
17 (U.S.N.M. 40703, 40708, 40971, 40978–81, 41089, 43055–63) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
8 (U.S.N.M. 41367–9, 41926–30) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41674) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41981) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
14 (U.S.N.M. 42009-12, 49416-25) Aberdare Mtns., K. C. (Heller) 1911.
3 (U.S.N.M. 42029, 49084, 49453) Kenya Colony. (Heller) 1911.
1 (U.S.N.M. 42252) Near Nimule, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 49227) Mt. Garguess, K. C. (Heller) 1911.
1 (U.S.N.M. 49230) Mt. Lololokwi, K. C. (Heller) 1911.

This series of skinks is characterized by (1) spinose scales on soles of feet except No. 42252, whose soles are similar to those of *bayonii*; (2) the subocular is not much narrowed inferiorly where there are only four labials anterior to it as in the majority of specimens or where there are only three labials anterior to the subocular as in No. 49423 or No. 43058, which is, however, normal on one side; there are four specimens (Nos. 40971, 40978, 41926, 49419) which possess four labials on one side and five on the other anterior to the subocular; No. 49227 has five on both sides; (3) paired frontoparietals, except No. 43059, which has a semidivided frontoparietal; (4) tricarinate dorsals; (5) short ear lobules except Nos. 41089, 41981, and 49417 where they are longer or as long as those of the paratype of Methuen and Hewitt's *M. varia longiloba* (M. C. Z. 22478) from Namaqualand.

Following the publication of the report on the Uluguru and Usambara reptiles in 1928, my friend Mr. Hewitt wrote and remonstrated with me for my share in placing *M. varia* var. *longiloba* in the synonymy of *M. varia varia* and pointing out that he had 11 specimens from Namaqualand all provided with long lobules. I promised to review my conclusions when reporting on the National Museum collection of *varia*; in these, which with one exception are from Kenya Colony, it will be observed that 6 per cent are of the *longiloba* type.

The collection of *varia* in the Museum of Comparative Zoölogy is comprised of 44 specimens from 17 localities; the series are short, mostly single examples in fact, except for one of 17 skinks from Mtali's, Mkalama, Tanganyika Territory. They may be separated thus:

| | Number of specimens | Long lobules | Per cent |
|---|---|---|---|
| Kenya Colony (vicinity of Mount Kenya) | 14 | 0 | 0 |
| Tanganyika Territory (mostly Central area) | 24 | [1] 3 | 12.5 |
| South Africa (Mozambique to Angola) | 5 | [1] 1 | 20 |

[1] Mtali's village, Mkalama; Shanwa, Mwanza; Hounslow, Cape Province.

I have been very careful to select only those of which there could be no question that their lobules were as long, often longer, than those of the paratype available for comparison.

My own view is that in East Africa *M. varia* is a rock or rather boulder loving skink chiefly found on mountain sides often at the edge of rain-forest. It can, however, live in a variety of situations and in the Dodoma Province of Central Tanganyika Territory it occurs abundantly among the boulders and bushes at the base of small rocky hills (*kopjes*) in this semi-arid thornbush region. I imagine that large lobules are somewhat of a protection to the tympanum in deflecting particles of sand during high winds and that therefore such lobules are likely to occur in a heavy percentage in such areas as Dodoma, Mtali's village, and Namaqualand. I must admit that I have never found anything like the hundred per cent of Mr. Hewitt's Namaqualand series but at the same time the series was admittedly small. I hope shortly to have the opportunity of collecting this skink over a wide area and trust that the resulting series may contribute more light on the subject as to whether the claims of *longiloba* to recognition are justified.

It might be remarked in passing that a skink from the plains west of Mount Kenya (M.C. 2, No. 12371) has the praefrontals and frontonasal fused into a single shield.

MABUYA VARIA variety

1 (U.S.N.M. 41977) Northern Guaso Nyiro, K. C. (Heller) 1911.
3 (U.S.N.M. 49413–5) Aberdare Mountains, K. C. (Heller) 1911.
1 (U.S.N.M. 49449) Kenya Colony. (Heller) 1911.

I have listed these five skinks separately, with the object of attracting attention to their very distinct appearance, though this is only of color and markings, as I can find no scale characters by which to distinguish them from typical *varia*, and it is to be observed that the latter occurs in all the localities cited for the variety. Their unique appearance is due to the entire absence of markings, all five being uniformly olive-green or brown above, bluish-grey or buffy-white below. They possess 30 to 32 mid-body scale rows and are equally typical in other respects. The largest specimen (No. 49413) is a pregnant female and measures 141 (53+88) mm.

MABUYA STRIATA (Peters)

*Tropidolepisma striatum* PETERS, 1844, Monatsber. Akad. Wiss. Berlin, p. 36.
*Mabuia striata* BOULENGER, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 204.

27 (U.S.N.M. 40674–83, 41137–49, 42937–41) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
21 (U.S.N.M. 40704–9, 40982, 41074–88) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
253 (U.S.N.M. 40779–80, 40782–6, 40792–816, 40819–28, 40830–7, 40839–70, 40872–9, 40881, 40883, 40922–6, 41003, 41005, 41015–73, 41232–306, 41611–70, 41675, 41963) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
51 (U.S.N.M. 41370–420) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41514, 41688, 62874) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
75 (U.S.N.M. 41536–97, 41599–610, 42043) Kenya Colony. (Sm. Afr. Exped.) 1909.
14 (U.S.N.M. 49069–71, 49207–16, 49389, 49393) Kaimosi, K. C. (Heller). 1911.
4 (U.S.N.M. 49156–9) ? Mt. Sagalla, K. C. (Heller) 1911.
2 (U.S.N.M. 63349–50) Kigoma, T. T. (Raven.) 1920.
10 (U.S.N.M. 63351–60) Victoria Nyanza. (Raven.) 1920.
2 (U.S.N.M. 63367–8) Elizabethville, B. C. (Raven). 1920.
20 (U. S. N. M. 63424–43) Nabea, U. (Raven.) 1920.
1 (U.S.N.M. 63486) Masindi, U. (Raven.) 1920.
1 (U.S.N.M. 63488) Lake, Tanganyika. (Raven.) 1920.
2 (U.S.N.M. 63523–4) Kafue River, Rhodesia. (Raven.) 1920.

The anterior head shields of this series of 486 skinks were examined to see if they showed any tendency toward varying in the direction of the peculiar arrangement found in *M. irregularis*, which was considered by its describer to be closely related to *M. striata* but differs in possessing a pair of frontonasals, forming a median suture and three praefrontals which separate the frontonasals from the frontal. It was found that nothing approaching this arrangement occurred except in four skinks whose azygous scalation appears to be almost certainly the result of injury received when immature. Thus 40779 has the praefrontals irregularly divided to form five shields; in 41059 there are apparently eight praefrontals and the frontonasal is in five parts; in 41144 the praefrontals are split into six scales and the frontonasal is semidivided along the median line; in 41613 the left praefrontal is split into three scales; the right is normal. The whole series, except Nos. 40677 and 40843, are normal in having the supranasals in contact behind the rostral; in the two exceptions the rostral is in contact with the frontonasals. In two or three specimens one or other of the supranasals is divided. If one excepts a dozen specimens with damaged heads only 16,[31] or 3.27 per cent, will be found to have the praefrontals in contact on the median line thus separat-

[31] Nos. 40704–5, 40779, 40861, 41059, 41144, 41232, 41401, 41514, 41597, 41614, 63420, 63424, 63434, 63436, 63438.

ing the frontonasal from the frontal which in the rest of the series are broadly or narrowly in contact. The small amount of variation exhibited by this species is surprising when one considers its near relative *varia* is so unstable.

The whole series is also uniform in displaying the characteristic pair of longitudinal dorso-lateral light lines. One male (No 63360) has the normally faint gray markings of the throat intensified into rich black blotches coalescing on the sides of the jaw, another male (No. 62874) has most of the underside uniformly plumbeous except for the limbs and a light area connecting them.

A female in the Museum of Comparative Zoölogy, collected by Dr. G. M. Allen at Mombasa on June 24, 1909, holds nine very advanced young; this number is unusually large.

MABUYA IRREGULARIS Lönnberg

*Mabuia* (*striata* ? *var.*) *irregularis sp. n.* ? Lönnberg, 1922, Arkiv för Zool., vol. 14, p. 4 (Soy, near Mt. Elgon, Kenya Colony).

*Mabuia* (*Mabuiopsis*) *jeanneli* Angel, 1923, Bull. Mus. Hist. Nat. Paris, p. 490; 1925, Rept. et Amph. in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12), Paris, p. 21, pl. 1, fig. 3 (Kinangop, Aberdare Mtns. Kenya Colony).

*Mabuia irregularis* Loveridge, 1923, Proc. Zool. Soc. London, p. 962 (Mt. Kenya, Kenya Colony).—Angel, 1929 (1928), Bull. Mus. Hist. Nat. Paris, p. 249.

*Mabuya irregularis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl. vol. 50, p. 161 (On taxonomy and range).

2 (U.S.N.M. 49082–3) Kenya Colony. (Heller) 1911.

It is a matter of great regret that Heller did not furnish the precise locality for these two beautifully preserved skinks; both appear to be females; certainly the larger one, measuring 190 (86+104) mm., is, for she holds well-developed ova in which are embryos. This individual is by far the largest of the eight examples now known.

These specimens furnish fresh evidence of the very variable nature of the head shields in this species. In No. 49082 there are 2 supranasals on the right and 3 on the left; one very enlarged nuchal on the left corresponding to 3 smaller ones on the right; the seventh upper labial is twice as large as any of the others. In No. 49083 there is a single pair of supranasals; one very enlarged nuchal not quite central and flanked on either side by four large scales bordering the parietals; in this skink it is the sixth upper labial which is twice as large as any of the others. In my points (see Loveridge, 1923) 1, 3, 4, 5, and 6 both are in agreement with my Kenya skink and with the type.

The stomach of one of these specimens holds a large hard-shelled curculionid beetle and two big black ants which look to me like *Paltothyreus* species.

### Genus LEIOLOPISMA Duméril and Bibron

#### LEIOLOPISMA CLATHROTIS (Boulenger)

*Lygosoma clathrotis* Boulenger, 1900, Ann. Mag. Nat. Hist., ser. 7, vol. 6, p. 194 (foot of Mt. Kenya, Kenya Colony).—Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 16 (In forest near Meru Boma, K. C.).—Angel, 1929 (1928), Bull. Mus. Hist. Nat., Paris, p. 249 (vicinity of Nairobi, K. C.).

1 (U.S.N. M.42517) Nairobi River, K. C. (Sm. Afr. Exped.) 1909.

This, the fifth known and largest specimen, measures 178 (68+110) mm. and agrees in closest detail with the type except that it possesses 24 instead of 22 mid-body scale rows and that the dotting, which Boulenger mentions as being confined to the sides, occurs sparsely on the back; these spots are arranged in 12 longitudinal series from side to side; they appear to be brown rather than black.

### Genus RIOPA Gray

#### RIOPA SUNDEVALLII (Smith)

*Eumeces* (*Riopa*) *sundevallii* Smith, 1849, Illustr. Zool. S. Africa, vol. 3, App. p. 11 (Natal).

*Lygosoma sundevallii* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 307.—Loveridge, 1920, Proc. Zool. Soc. London, p. 155.

*Riopa sundevallii* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 722 (Tana River, K. C.).

1 (U.S.N.M. 20109) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 40778) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41979, 42171–2) Nairobi, K. C. (Sm. Afr. Exped.) 1909.

There is nothing noteworthy about this small series of Sundevall's skink though it might be remarked that the fourth toe is equal to (No. 42172) or much longer (No. 20109) than the third; in the other three specimens it is but slightly longer. Some might prefer to identify the Tana River specimen with Boulenger's *ferrandii* from Lugh, Somaliland. The only character on which I was able to differentiate that species in 1923 [32] was by the much longer fourth toe. In the arid sandy thorn-bush steppe of Central Tanganyika Territory (Dodoma Province) all the specimens which I have collected agree with *ferrandii* in this character, but on looking over a series of 50 *sundevallii* from Lumbo, Mozambique, I find every gradation from third and fourth toes of equal length to others even longer than is the case with the type of *ferrandii*. I prefer to leave the status of the latter until more material is available.

#### RIOPA ANCHIETAE (Bocage)

*Eumecia anchietae* Bocage, 1870, Jorn. Sc. Lisboa, vol. 3, p. 67, pl. 1 (Huilla Plateau, Mossamedes).

*Lygosoma anchietae* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 316.

7 (U.S.N.M. 49028–34) Kenya Colony. (Heller) 1911.
7 (U.S.N.M. 49061–5, 49392, 49810) Kaimosi, K. C. (Heller) 1911.

[32] Proc. Zool. Soc. London, p. 859.

Doubtless the whole series came from Kaimosi, one of the few places in East Africa where the species appears to be common. No 49810 is an embryo and is not included in the following remarks. The largest specimen (No. 49031) measures 424 (195+229) mm. but is surpassed in body length by another (No. 49029), which is 394 (201+193) mm.; in both the end of the tail is reproduced. This regeneration occurs in all except two young specimens; the condition is not obvious, but the reproduced portion may be known by the discontinuance of the two dorso-caudal dark lines above and the scaling beneath; in original tails there are a number of small scales below, but in reproduced tails their position is taken by single transverse scales similar in appearance to the ventrals of a snake. It is obvious that the original tail is much longer than the head and body being, in fact, 0.61 and 0.62 of the total length in the two perfect specimens, of which the larger measures 240 (92+148) mm.

This species appears to be one of the least variable of the skinks; in every particular, with perhaps the exception of an individual which has an additional (third) ear lobule and some which might be said to have 4 to 5 supraoculars and 4 to 5 supraciliaries, the whole agrees with Boulenger's description based on Bocage's original one, for in 1887 the species was unrepresented in the British Museum collection

### Genus SIAPHOS Gray

#### SIAPHOS KILIMENSIS (Stejneger)

*Lygosoma kilimensis* Stejneger, 1891, Proc. U. S. Nat. Mus., vol. 14, p. 405 (Kilimanjaro, Tanganyika Territory).

*Siaphos kilimensis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 163 (Uluguru and Usambara Mtns., Tanganyika Territory).

*Type.*—(U.S.N.M. 16749) Mt. Kilimanjaro, T. T. (Abbott) 1889.

This, the type of a well-established species, has not been examined; the specific name was well chosen, for it has proved to be a mountain loving form; discussion of variability will be found in the second citation given above.

### Genus ABLEPHARUS Fitzinger

#### ABLEPHARUS WAHLBERGII (Smith)

*Cryptoblepharus wahlbergii* Smith, 1849, Illustr. Zool. S. Africa, vol. 3, Appendix, p. 10 (Natal).

*Ablepharus wahlbergii* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 350 (Natal; Lake Nyasa; near Lake Tanganyika, etc.).—Angel, 1929 (1928), Bull. Mus. Hist. Nat., Paris, p. 249 (vicinity of Nairobi, K. C.).

*Ablepharus massaiensis* Angel, 1924, Bull. Mus. Hist. Nat., Paris, p. 52 (Massai Plains near Nairobi, Kenya Colony).

1 (U.S.N.M. 41090) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.

9 (U.S.N.M. 41982–5, 42518, 43000, 43074–5, 43078) Nairobi and Nairobi River, K. C. (Sm. Afr. Exped.) 1909.

1 (U.S.N.M. 42017) Kenya Colony. (Sm. Afr. Exped.) 1909.

It was of considerable interest to me to examine this series from the type locality of *massaiensis* and find in them confirmation of the conclusions reached last year. The whole series has the normal number of three supraoculars, so that it is still more obvious that the monotype of *massaiensis* was aberrant in possessing two; the mid-body scale rows range from 24 to 28, with an average of 26. It would be interesting if some one would examine a really adequate series of South African specimens and ascertain whether the average in the southern part of the continent is 26 or 24; if the latter it might be possible to recognise *massaiensis* as an eastern race, based only upon a higher average number of mid-body scale rows. No. 43000 is the only skink with 28 rows in the above series.

### Genus CRYPTOBLEPHARUS Wiegmann

#### CRYPTOBLEPHARUS BOUTONII PERONII (Cocteau)

*Cryptoblepharus peronii* Cocteau, 1836, Études sur le Scincoides, Paris, sec. 2, p. 1, plate, figs, *la–f* (Van Diemen's Land).

*Ablepharus boutonii* var. *peronii* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 347.—Loveridge, 1920, Proc. Zool. Soc. London, p. 157; 1925, Proc. Zool. Soc. London, p. 74.

2 (U.S.N.M. 62881–2) Mombasa, K. C. (Loveridge) 1918.

Besides the foregoing I have made use of the following material which is listed geographically from north to south:

3 (M.C.Z. 7994) Mombasa, K. C. (Allen) 1909.
1 (M.C.Z. 19132) Vitongozi, Pemba Id. (Loveridge) 1923.
2 (M.C.Z. 13546–7) Dar es Salaam, T. T. (Loveridge) 1918.
30 (M.C.Z. 18701–6) Lumbo, Mozambique. (Loveridge) 1918.

In employing the name *peronii* for East African specimens I do so tentatively and without being definitely convinced that Sternfeld's name *africanus* should not be used. This name,[33] proposed by Sternfeld in 1920,[34] escaped the Zoological Record, owing to the reprehensible manner in which its author presented it under the heading of *A. peroni peroni* Coct. (*sic*) in the form of a key. In Sections II and III of the key new names were also proposed for specimens from Madagascar, Aldabra, and Juan de Nova, while Boettger's *A. b. ater* and *A. b. bitaeniatus* are recognised for the Grand Comoro and Europa Island respectively.

More recently Mertens [35] has added to this list of East Coast races *C. b. ahli* from Mozambique Island and says that *C. b. africanus* occurs on the adjacent mainland. In 1918 I collected 50 examples of this common species on the beach at Lumbo, which is on the mainland about 3 miles from Mozambique Island. The 30 specimens of

[33] *A. b. africanus*, new subspecies (sic).
[34] Sternfeld, 1920, Abhand. Senck. Naturf. Gesell., vol. 36, p. 423.
[35] Mertens, 1928, Zool. Anz., vol. 78, p. 85.

this series listed above appear to me to be much nearer *ahli* than *africanus* despite Mertens' statement that *africanus* is the mainland form as shown by Peter's collections. At the same time they certainly are in no way separable from the Dar es Salaam and Pemba skinks, and the specimen of the latter is supposedly topotypic of *africanus*. Were this not the case one might presume the existence of a southern race from Pemba to Mozambique (*ahli*) and a northern from Mombasa to Manda (*africanus*).

Sternfeld's key is divided into three sections as follows:

1. Scales in 22 rows.
2. Scales in 24 rows (sometimes 22 or 26).
3. Scales in 26 to 28 rows (sometimes 24).

And it might be said that for all practical purposes these very artificial major divisions are useless. The Lumbo series, for example, is comprised of 5 skinks with 22, 20 with 24, and 5 with 26 rows, giving an exact average of 24, which causes these skinks to fall into the Comoro-Madagascar-Aldabra Section II.

The minor divisions are based on color and the whole description of *africanus* appears under Section I, c. and might be translated as follows: "Upper side brown or greenish-brown; dorsolateral stripes very sharply defined, edged with dark border; middle of the back somewhat brighter * * * *A. b. africanus* new subspecies (Manda, Mandabucht, Malindi, Pemba)."

The tabulation of the material available to me is as follows:

| Number of specimens | Locality | Scale rows | Average number | Labials ante subocular | Length of head and body |
|---|---|---|---|---|---|
| | | | | | *Millimeters* |
| 5 | Mombasa, K. C. | 22–24 | 22 | 4–5 | 39–43 |
| 1 | Pemba Island | 22 | 22 | 4 | 46 |
| 2 | Dar es Salaam, T. T. | 22–24 | 23 | 4 | 45–47 |
| 30 | Lumbo, Mozambique | 22–26 | 24 | 4–5 | 32–46 |

I have already recorded specimens from Pemba with 24 mid-body scale rows, so that, though at first sight there does appear to be an increase in scale rows as one proceeds southwards, the average number at Pemba would be 24 if I included all the material I have examined. These series are too small for one to form definite conclusions.

Mertens has said that though his type of *ahli* has 5 labials anterior to the subocular, 4 is the number in all his paratypes. This is in keeping with my conclusions that 4 is the normal number and 5 occurs only as a deviation from it. Two of the Mombasa skinks have 5 on one side of the head and 4 on the other.

Apart from coloring, *ahli* is said to differ in its larger size; the type, a female, measures 50 mm. The three largest females in the Lumbo series are 46, 46, and 45 mm., respectively; 17 of the 30 Lumbo skinks are over 40 mm.; 6 of these are males ranging from 40 to 43 mm., with an average of 41.1 mm.; 11 are females ranging from 40 to 46 with an average of 43.3 mm. Whether the type of *ahli* is abnormally large or of average size on the island it is difficult to say with so small a series as Mertens had at his disposal.

I have often been struck by the more vivid coloring presented by Mombasa skinks as opposed to those from Pemba, Dar es Salaam, and Lumbo, and in general these Mombasa skinks though lighter than those from further south are darker than Australian *peronii*. In the nine lots of that race (excluding African) in the Museum of Comparative Zoölogy, however, at least two skinks are indistinguishable from Mombasa specimens. These are No. 7672 from British Papua and 9490 from Darnley Island, Torres Straits.

As already hinted East African *boutonii* may be divisable into a northern and southern race on the basis of *average* number of scale rows, darker coloring of the southern specimens, and possibly slightly larger size of the southern specimens. The Mombasa skinks, however, can only be separated from typical *peronii* on a basis of average color difference.

Such questions naturally arise as to how far we are justified in accepting racial names based on color variations only; and if done, is not such a course bound to lead to endless confusion? Boulenger says that the races of *boutonii* are "irregularly distributed over the hotter parts of both hemispheres." How came *boutonii* to be so widely distributed? The theory that human agency has played no small part seems inescapable. If human agency was responsible for transporting these little skinks in times past when there was much less sea-borne traffic than there is to-day, is it not reasonable to suppose that the settlements of these skinks are being augmented at the present time by arrivals from other coasts?

It is not difficult to theorize as to how such transportation takes place at Lumbo, where I spent six months and observed the methods of loading and unloading barges and dhows, which at that time was taking place daily. At Lumbo there is a low, shelving shore of sand and coral rag, and it is in the fissures and crannies of the latter that the skinks take refuge from the incoming waves. As the waves retire the skinks emerge from their retreats to hunt for shrimps, sea slaters, and other small marine creatures which are stranded in the numerous hollows of these rocks. When a steamer or dhow arrives, of necessity it anchors a long way from the beach, transfers its cargo to boats which are able to approach several hundred yards nearer, once again the cargo is transferred, this time to the heads of

natives, who carry it ashore and leave it above high-water mark for the land gang to remove inland. The converse process also occurs at daybreak, or when the dhow appears in sight, a *safari* of porters arrives at the beach, deposit their loads as near high water mark as possible, and return for more; there the loads remain for hours, or even days, while the dhow is unloading and until she is ready to take cargo on board. What more likely than that a few skinks, disturbed perhaps by an approaching native, seek refuge in a bundle of hides or bale of market produce and, being taken up, get transported to the dhow? I can scarcely credit that the skink on Mozambique Island is in any way specifically distinct from that on the near-by mainland. In 1918, as I recollect, there was a daily dhow ferry service between Lumbo and Mozambique Island for the transport of natives who took their garden produce to sell in the market on the island.

## Suborder RHIPTOGLOSSA

## Family CHAMAELEONTIDAE

### Genus CHAMAELEON Gronovius [36]

#### CHAMAELEON SENEGALENSIS LAEVIGATUS (Gray)

*Chamaeleon laevigatus* GRAY, 1863, Proc. Zool. Soc. London, p. 95 (500 miles south of Khartoum).

*Chamaeleon senegalensis* (part) BOULENGER, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 447.

*Chamaeleon senegalensis laevigatus* GÜNTHER, 1888, Proc. Zool. Soc. London, p. 50.—SCHMIDT, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 580, text map, pl. 30, fig. 2.

1 (U.S.N.M. 37301), Uganda. (Werner) N. D.
2 (U.S.N.M. 42013–4) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42221) Kikonda, U. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42254) Sururu, L. E. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 63474) Nabea, U. (Raven) 1920.

With the limited material at my disposal, which, besides the foregoing, consists of only 6 West, 1 Central, and 1 East African example in the Museum of Comparative Zoölogy, it is possible to uphold *laevigatus* as a race. Schmidt distinguished the two forms as follows:

Lateral crests distinct; casque raised from nape (Western)------ **senegalensis.**
Lateral crests distinct, faint parietal crest nearly continuous with the low dorsal crest (Eastern)---------- **laevigatus.**

By lateral crests I take it that the posterior lateral are meant, and in this character the Senegal and Senegambia specimens in the Museum of Comparative Zoölogy certainly show more strongly developed crests than specimens from the Cameroons, Victoria Nyanza, or Meru District of Kenya Colony, or any of the National Museum

[36] 1763.

series cited above. The fact that Cameroon chameleons belong to *laevigatus* would lead one to suppose that the main factor in their distribution has a good deal to do with rain forest, the designation of western and eastern for the two forms is therefore ill chosen. It might be remarked in passing that the National Museum series may be divided into two groups, according to the development of the canthal crests or ridges, which are strong in the Uganda specimens and weak in those from Sururu and Fort Hall; it would be well to bear in mind, however, that a great deal depends upon the condition of the reptile, for in a well-nourished chameleon crests and ridges are much less conspicuous than in one that has been starved before preservation, as seems to be so frequently the case with examples of this genus.

As pointed out by Schmidt, there is considerable variation in the length of their tails, which may be longer (27301) than the body, though normally shorter. The tail length in this series ranges from 0.39 to 0.50 of the total, with an average of 0.45. Both specimens attaining the greatest size are females, the larger (42221) measuring 202 (116+96) mm.; the smallest of the series measures 88 (50+38).

One female (No. 42221), taken on December 31, holds very small eggs, another (No. 63474), taken on July 12, has eggs somewhat more developed. The stomach of the smallest specimen holds a large locustid.

### CHAMAELEON GRACILIS GRACILIS (Hallowell)

*Chamaeleo gracilis* Hallowell, 1842, Journ. Acad. Nat. Sci. Phila., p. 324, pl. 18 (Monrovia, Liberia).

*Chamaeleon gracilis* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 448, pl. 39, fig. 4.—Schmidt, 1919, Bull. Amer. Mus. Nat. Hist., vol. 39, p. 570, pl. 30, fig. 1.

1 (U.S.N.M. 42222) Kikonda, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 42481) Lake Hannington, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 63475) Masindi, U. (Raven) 1920.

The larger of the two males (both of which are spurred) measures 236 (117+119) and the solitary female (No. 42481) only 185 (100+85) mm. The tail length of the latter is 0.45 of the total length; that of the males is 0.50 and 0.54, a slight extension over 0.43 to 0.52, which Schmidt records for his Congo series.

I have employed trinomials for this species after carefully comparing topotypic examples of *gracilis* with paratypes of Schmidt's *etiennei* from Banana, Belgian Congo. The only difference that I can find between the two forms is the fact that males of *etiennei* lack a tarsal process or spur. In this respect, therefore, *C. etiennei* stands in precisely the same relation to *gracilis* as *roperi* does to *quilensis*, and as both the latter have long been considered races of *dilepis* for consistency of treatment one must regard *etiennei* as no more than a race of *gracilis*.

I must assume that Boulenger was correct in saying that the male of *gracilis* is spurred, for it is impossible to sex either of the spurless specimens from Monrovia in the collection of the Museum of Comparative Zoölogy. Hallowell's monotype was a female. Boulenger had four males from West Africa and one from Adjah Bippo, Gold Coast. The only two males among the large series of *gracilis typica* in the Museum of Comparative Zoölogy collection are from the Gold Coast and Bathurst, Gambia.

Of spurless males, which I refer to *gracilis etiennei*, there are, in addition to the paratypes from Banana, a single specimen from Kinshasa, which is near Leopoldville and not far from Banana, and two large adults labeled "West Coast of Africa."

How far the presence or absence of a spur is to be considered of specific importance remains to be seen. I might remark, however, that of 17 males which I collected at Morogoro, Tanganyika Territory, of *C. dilepis dilepis*, 2 are well spurred, 5 have the spur indicated, while 10 are spurless. See also remarks under *C. d. roperi*.

CHAMAELEON DILEPIS ROPERI (Boulenger)

*Chamaeleon roperi* Boulenger, 1890, Proc. Zool. Soc. London, p. 85, pl. 8, fig. 4 (Kilifi, north of Mombasa, Kenya Colony).

*Chamaeleo roperi* Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 724.

4 (U.S.N.M. 16741–2, 16745–6) Mt. Kilimanjaro, T. T. (Abbott) 1898–99.
2 (U.S.N.M. 20103, 20108) Tana River, K. C. (Chanler) 1892.
2 (U.S.N.M. 22088–9) Jombéni Range, K. C. (Chanler) 1892.
2 (U.S.N.M. 40989, 42037) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41931) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 48565–6) Mtoto Andei, K. C. (Heller) 1911.

Of these 13 specimens 5 are males and 8 are females. The largest of the former measures 192 (100+92) mm. and of the latter 277 (142+135) mm. There seems to be little sexual difference in the length of their tails; one female has lost hers at the root and the stump has healed perfectly; this is the only example of total tail loss in these arboreal reptiles which I have seen. Omitting this individual the rest of the series range from 0.43 to 0.48 of the total length with an average of 0.46 for males and for females alike.

I am not quite sure of the validity of *C. d. roperi* as distinct from *C. d. quilensis;* the only appreciable difference is the absence of a tarsal spur or process in the males of the former. This is not an age character, as one of the types of *roperi* was a very fine adult male; none of the males in the present series or in the Museum of Comparative Zoölogy exhibit spurs. As might be expected the series from Ifakara, Tanganyika Territory, reported on by Barbour and Loveridge in 1928 as *C. d. quilensis* are somewhat of intermediates with or without tarsal processes. See also remarks under *C. gracilis gracilis*.

CHAMAELEON DILEPIS QUILENSIS Bocage

*Chamaeleo dilepis* var. *quilensis* Bocage, 1866, Jorn. Sci. Lisboa, vol. 1, p. 59 (Rio Quillo, Angola).

*Chamaeleon parvilobus* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 449, pl. 39, fig. 5 (Cameroons; Gaboon; Natal; South Africa.)

1 (U.S.N.M. 63013) Victoria Falls, Zambezi. (Raven) 1919.

This female, measuring 212 (110+102) mm., has rather large dermal lobes for *quilensis*. Its ovaries show only minute ova; it was collected on November 4, 1919.

CHAMAELEON DILEPIS DILEPIS Leach

*Chamaeleo dilepis* Leach, 1819, in Bowdich, Miss. Ashantee, App., p. 493 (Gaboon).—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 724.

*Chamaeleon dilepis* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 450, pl. 39, fig. 6.

*Chamaeleon isabellinus* Günther, 1892, Proc. Zool. Soc. London, p. 556, pl. 33, fig. 2. (Nyasaland).

*Chamaeleon ruspolii* Boettger, 1893, Zool. Anz., p. 116 (Ogaden, Somaliland).

*Chamaeleon dilepis isabellinus* Lönnberg, 1911, Svenska Vetensk-Akad. Handl., vol. 47, No. 6, p. 19 (Meru Boma, Kenya Colony).

*Chamaeleo angusticoronatus* Barbour, 1903, Proc. Biol. Soc. Wash., vol. 5, p. 61 (Zanzibar).

2 (U.S.N.M. 20074–5) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 48564) Mtoto Andei, K. C. (Heller) 1911.
2 (U.S.N.M. 63511–2) Kafue River, Rhodesia. (Raven) 1919.

The single spurred male (No. 20075) measures 173 (82+91) mm.; the largest (No. 63511) of the four large females is 315 (162+153) mm.

Günther based his description of *isabellinus* on a single specimen received from Nyasaland which he differentiated from *dilepis* by the large scutes of the occipital flaps and in the description one notes that "the distance between the commissure of the mouth and the extremity of the casque is considerably longer than the length of the mouth"; also "the scutes on the crown are flat, not tubercular." The second and third points do not distinguish it from *dilepis* as in any large series from East or West Africa scutation of both types may be found and the relative distances between commissure and casque agree with *isabellinus*. Werner in 1902 identified Boettger's *ruspolii* from Somaliland with *isabellinus* and specimens of the large scaled type have been recorded from Meru in Kenya by Lönnberg and from Gulwe and Dodoma in Tanganyika by myself.[37] I have recently reexamined part of a large series from Dodoma and found examples with 4, 5, and 6 scutes (*isabellinus* had three). The difference between these Dodoma and Morogoro *dilepis* and West African *dilepis* is well marked, but there seems to be no difference between West African specimens and those from the Tana River, Usambara Mountains,

[37] Loveridge, 1920, Proc. Zool. Soc. London, p. 163.

Zanzibar, and Mozambique. Those from Mtoto Andei, the Kafue River, and Landau in Angola are of the larger scaled kind, but there are so many intergradations and the distribution is so irregular that I think it is impossible to recognise *isabellinus* as a race.

*Chamaeleo angusticoronatus* was founded on an individual which possessed a combination of characters or variations, all of which may be found in a large series. After comparing the holotype with typical *dilepis* from Zanzibar and the adjacent mainland, I do not think that it can reasonably be considered specifically distinct, particularly as no other specimens have appeared in the quarter of a century since it was described.

#### CHAMAELEON BITAENIATUS BITAENIATUS Fischer

*Chamaeleo bitaeniatus* Fischer, 1884, Jahrb. Hamb. Wiss. Anst., vol. 1, p. 23, pl. 2, fig. 7. (Massai Land, East Africa.)

*Chamaeleon bitaeniatus* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 452.

*Chamaeleon bitaeniatus* var. *bitaeniatus* Tornier, 1897, Kriechthiere Deutsch-Ost-Afrikas, Berlin, p. 50.

1 (U.S.N.M. 40729) Southern Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40933) Lukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40951) Sotik, Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41708–10) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 48567–9) Mtoto Andei, K. C. (Heller) 1911.
9 (U.S.N.M. 49170–8) ? Mt. Sagalla, K. C. (Heller) 1911.
7 (U.S.N.M. 49378–84) ? Kakumega, K. C. (Heller) 1911.
4 (U.S.N.M. 49443–6) Kenya Colony. (Heller) 1911.

The series is composed of 13 males and 16 females; as a rule the sexes can not be distinguished from external appearance. The largest male measures 149 (84+65) mm. and the largest female is 159 (80 +79) mm. Two chameleons, one of either sex, have lost the tips of their tails; after excluding these it was found that the tails of the males range from 0.43 to 0.50 of the total length, with an average of 0.461; in the females the range is from 0.41 to 0.49, with an average of 0.447; the overlapping is so frequent that the length of the tail is no guide to sex; in both sexes it is almost invariably shorter than the length of the head and body; in only one chameleon, a male (40729), does it equal the body length; in no specimen does it exceed it. Eighteen embryos are present in one female and are so well developed that it is evident that this race is ovo-viviparous.

#### CHAMAELEON BITAENIATUS HÖHNELII (Steindachner)

*Chamaeleon höhnelii* Steindachner, 1891, Sitzber. Akad. Wiss. Wien, vol. 100, p. 307, pl. 1, fig. 1 (Leikipia, Kenya Colony).

*Chamaeleon leikipiensis* Steindachner, 1891, Sitzber. Akad. Wiss. Wien, vol. 100, p. 309, pl. 1, fig. 2 (Leikipia, Kenya Colony).

*Chamaeleon bitaeniatus* Boulenger, 1892, Ann. Mag. Nat. Hist., ser. 6, vol. 9, p. 72.

*Chamaeleon bitaeniatus* var. *höhneli* TORNIER, 1897, Kriechthiere Deutsch-Ost-Afrikas, Berlin, pp. 51, 55 (Leikipia; Mau); 1900, Zool. Jahrb. Syst., vol. 13, p. 611 (Mt. Kenya).

*Chamaeleon bitaeniatus* var. *leikipiensis* TORNIER, 1897, Kriechthiere Deutsch-Ost-Afrikas, Berlin, pp. 51, 55 (Leikipia; Marangu; Kifinika; Gurui).—WERNER, 1902, Zoöl. Jahrb. Syst., pp. 345, 347 (same localities).

*Chamaeleon bitaeniatus* var. *hoehneli* WERNER, 1902, Zool. Jahrb. Syst., pp. 346, 347 (Mt. Kenya; Kibibi-Becken, Mau Mtns.; Leikipia; Mt. Elgon, Uganda).

*Chamaeleon hochneli* MEEK, 1910, Field Mus. Nat. Hist. Pub. 147, Zoöl. Series, vol. 7, p. 413 (Voi; Lukenya; Mt. Kenya; Kijabe; Molo).

*Chamaeleon bitaeniatus höhneli* WERNER, 1911, Das Tierreich. Chamaeleontidae, p. 15 (British East Africa, about 2,500 meters).—NIEDEN, 1913, Mitt. Zool. Mus., Berlin, p. 93 (British East Africa).

*Chamaeleon bitaeniatus hoehneli* LÖNNBERG, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 19 (Mt. Kenya).

*Chamaeleon bitaeniatus leikipiensis* WERNER, 1911, Das Tierreich. Chamaeleontidae, p. 15 (British East Africa, about 2,000 meters).—NIEDEN, 1913, Mitt. Zool. Mus., Berlin, p. 92 (Repeats localities).

*Chamaeleon bitaeniatus bergeri* STERNFELD, 1912, Ergebn. Deutsch. Zentralafr. Exp. 1907–08, vol. 4, p. 255, pl. 9, fig. 4 (Sirgoi); 1912, Sitzber. Ges. Naturf Freunde Berlin, p. 381, pl. 14, figs. 13–15.—NIEDEN, 1913, Mitt. Zool. Mus. Berlin, p. 93 (Cities type locality).

*Chamaeleon hoehnelii* LOVERIDGE, 1920, Proc. Zool. Soc. London, p. 163 (Kabete; Mt. Kenya, western slopes); 1923, Proc. Zool. Soc. London, p. 967 (Kabete).

*Chamaeleon bitaeniatus höhnelii* LÖNNBERG, 1922, Arkiv för Zool., vol. 14, No. 12, p. 6 (Machakos; Londiani; Mt. Elgon).

*Chamaeleon bitaeniatus höhneli* ANGEL, 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912), Paris, p. 28 (Mt. Kinangop; Mt. Kenya; Londiani; Molo).

183 (U.S.N.M. 40256–85, 40355–85, 40526–85, 40606–65, 41969, 42018) Kenya Colony. (Sm. Afr. Exped.) 1909.

211 (U.S.N.M. 40286–304, 40325–54, 40386–525, 40586–605, 41535, 41794–6, 41974) Wambugu, K. C. (Sm. Afr. Exped.) 1909.

20 (U.S.N.M. 40305–24) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.

11 (U.S.N.M. 40666–73, 41355–7) Mt. Kenya to Fort Hall, mostly Kasorongai River, K. C. (Sm. Afr. Exped.) 1909.

1 (U.S.N.M. 40699), Meru, K. C. ((Sm. Afr. Exped.) 1909.

5 (U.S.N.M. 40700–2, 40972, 41677) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.

The foregoing bibliography gives most of the variations under which references to this race occur. All the localities are in Kenya Colony, excepting Kifinika and Gurui, in Tanganyika Territory, and Werner's locality of Mount Elgon, Uganda, which implies that it has been taken on the western side of the mountain.

This is undoubtedly the finest series of the species existing in any museum, and an examination of it should tend to dissuade those who are inclined to propose racial names for single individuals which do not agree in every particular with the original description. The sooner that recognition is accorded to the fact that chameleons are

variable reptiles the earlier we shall arrive at a better understanding as to their distribution.

Boulenger (1892) was undoubtedly correct in assuming that both *höhnelii* and *leikipiensis* were one and the same thing but incorrect in relegating them to *bitaeniatus*, of which he considered that they were fully adult males. More recently (1912) Sternfeld has named another race from Sirgoit (Sirgoi) on the Uasin Gishu Plateau near Mount Elgon; on geographic grounds I have long suspected that his monotype was nothing more than a slightly aberrant individual; fortunately in his paper on the races of *bitaeniatus* he gives very excellent illustrations of the races including the type of *bergeri*. One can match its steeply sloping casque as well as the more gently sloping one of *höhnelii* in plenty of specimens of the National Collection series which also provide examples of low and high crests and many variations of the arrangement of the spines which go to form those crests. From the Wambugu series one can select specimens with rostral processes (knoblike swellings) as small as the type of *höhnelii* or as large as in the type of *bergeri*. Sternfeld describes the rostral process as "budlike" and from the illustration it rather looks as if it were descaled; if this is the case it is almost certainly the result of an injury and I should be inclined to postulate the theory that the type was kept a captive, during which time it rubbed its snout against its prison walls in inanely persistent efforts to escape.

Without any selection apart from sex, 25 males and an equal number of females were taken for measurement; of these the largest male measured 200 (108 + 92) mm. and the largest female 194 (99 + 95) mm. The tails of these males ranged from 0.46 to 0.52 of the total length, with an average of 0.512; in the females the range was from 0.43 to 0.51, with an average of 0.473; in connection with similar measurements taken for *bitaeniatus typica* it is worthy of note that two females, or 8 per cent, and six males, or 24 per cent, have the tails definitely longer than the head and body, while three additional males possess tails which equal the length of head plus body. A male embryo was measured and found to be 46 (25 + 21) and an apparently new-born specimen (No. 41969) measured 50 (26 + 24) mm.

A large percentage of the females are gravid, with large embryos; many of the authors cited in the bibliography have remarked on the number of young produced, etc. The stomach contents of several chameleons examined consisted largely of beetle elytra; in addition, one ladybird (coccinellid) and one butterfly (apparently pierine) were distinguishable.

CHAMAELEON JACKSONI VAUERESCECAE Tornier

*Chamaeleon jacksoni* var. *vauerescecae* Tornier, 1903, Zool. Jahrb. Syst., p. 176 (Forest at 7,000 feet at Nairobi, Kenya Colony).—Werner, 1911, Das Tierreich. Chamaeleontidae, p. 26.—Loveridge, 1920, Proc. Zool. Soc. London, p. 163 and 1923, p. 967 (Nairobi).

*Chamaeleon jacksoni* Meek, 1910, Field Mus. Nat. Hist. Pub. 147, Zool. series, vol. 7, p. 413 (Lukenya Province, Kenya Colony).

3 (U.S.N.M. 40696–8) Meru, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 40977, 41678, 43054) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41797–9) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42489), Nairobi River, K. C. (Sm. Afr. Exped.) 1909.

*Chamaeleon jacksoni* Boulenger [38] was described from a single half-grown male collected by Sir F. J. Jackson in Uganda. It has since been recorded from Meru by Lönnberg [39] who has an excellent plate of the 3-horned male and its hornless female. The race *vauerescecae*, which Tornier described from the Nairobi forests, is characterized by the female possessing horns like the male, though usually much shorter, and frequently, though by no means invariably, the occipital horns of these females are shorter than the rostral. Meek discusses this point under the name of *C. jacksoni* though his specimens are obviously of Tornier's race.

The largest male (No. 40697) in the above series measures 238 (119+119) mm. Apparently all but two of the series are males; certainly all 10 are horned, hence the reason for my employing the name *vauerescecae* for them. Six of the specimens, however, are very young and of doubtful sex, though I should think that one (No. 41797) is a female. The only adult female (No. 41678) was obtained on the west side of Mount Kenya and carries 10 enlarged eggs; she measures 137 (73+64) mm. and has a 6 mm.-long rostral horn in process of regeneration; the occipital horns are scarcely distinguishable as minute spines not, or scarcely, larger than the adjacent scales. From this one would conclude that Mount Kenya chameleons are referable to the Nairobi race but on examining the series from Embu and Meru in the Museum of Comparative Zoölogy I find that hornless and horned females occur at both these places, which are not far distant from Mount Kenya. It is undoubtedly true, however, that only horned females occur at Nairobi, so that the almost topotypic specimen (male) from Nairobi River is undoubtedly of the *vauerescecae* race. If it can be shown that there is a locality or region such as Uganda in which only hornless females occur, then we must consider Meru-Embu-Wambugu-Kenya zone as the meeting place where, though the females may be arbitrarily sorted into *jacksoni typica* and *jacksoni vauerescecae*, the males must remain intermediates.

[38] Boulenger, 1896, Ann. Mag. Nat. Hist., ser. 6, vol. 17, p. 376.
[39] Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 20, pl. 1, figs. 1 and 2

CHAMAELEON FISCHERI EXCUBITOR (Barbour)

*Chamaeleo tenuis excubitor* Barbour, 1911, Proc. Biol. Soc. Washington, vol. 24, p. 219 (Meru district, north of Mt. Kenya, Kenya Colony).

*Chamaeleon affinis embuensis* Lönnberg, 1911, Svenska Vetensk.-Akad. Handl., vol. 47, p. 19 (Mt. Kenya forest, on eastern slope, one day's march from Embu, Kenya Colony), pl. 1, fig. 3.

*Chamaeleo fischeri excubitor* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 176.

In studying Lönnberg's plate of *C. jacksoni* my attention was attracted by the third figure and its striking resemblance to the type of *C. f. excubitor.* On turning to the text I found that Lönnberg had proposed a name for this specimen in the body of the text with the result that this name has successfully eluded inclusion in the Zoological Record. On comparing the figure and Lönnberg's remarks with the type of *excubitor,* in the collection of the Museum of Comparative Zoölogy, I find that without the slightest doubt they represent one and the same species. Comparison was made with a true specimen of *Chamaeleo affinis* from Ethiopia (Abyssinia), which is a very distinct species.

Fortunately no doubt can exist as to priority, for both papers are dated, that containing the description of *excubitor* appearing on October 31, 1911, while Lönnberg's paper did not appear till November 16, 1911.

CHAMAELEON TAVETENSIS Steindachner

*Chamaeleon tavetensis* Steindachner, 1891, Sitzber. Akad. Wiss. Wien, vol. 100, p. 310, pl. 1, figs. 3 and 3a.

*Chamaeleo abbotti* Stejneger, 1891, Proc. U. S. Nat. Mus., vol. 14, p. 353, text fig.

1 (U.S.N.M. 16744) Kilimanjaro, T. T. (Abbott) 1889.

This specimen, the type of *C. abbotti,* has not been examined. It was described before Steindachner's paper on *tavetensis* reached the National Museum library and lost priority by only a few months.

## Genus RHAMPHOLEON Günther

RHAMPHOLEON KERSTENII (Peters)

*Chamaeleo kerstenii* Peters, 1868, Monatsber. Akad. Wiss. Berlin, p. 449 (Wanga near Mombasa, K. C.).

*Rhampholeon kerstenii* Boulenger, 1887, Cat. Lizards Brit. Mus., vol. 3, p. 475 (Rabai, K. C.; Mpwapwa, T. T.).

1 (U.S.N.M. 22084) Jombeni Range, K. C. (Chanler) 1892.

A single specimen measuring 86 (49 + 37) mm. [After this paper had been sent to press, Miss Cochran informed me that a second example (U.S.N.M. 58850) Uganda (Hurter) had been located.]

# Class AMPHIBIA

## Order SALIENTIA

### Family PIPIDAE

#### Genus XENOPUS Wagler

##### XENOPUS LAEVIS (Daudin)

*Bufo laevis* DAUDIN, 1803, Hist. Nat. des Rainettes, p. 56, pl. 30, fig. 1. (Type locality unknown.) (Boulenger's citation of p. 85 is incorrect.)
*Xenopus laevis* BOULENGER, 1882, Cat. Batr. Sal. Brit. Mus., p. 456, text fig.

10 (U.S.N.M. 40904–12, 41712) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
22 (U.S.N.M. 40716–26, 40959–60, 41680–1, 41683–4, 41803–6) Southern Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40690) Mt. Kenya to Fort Hall, mostly Kasorongai River, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 40756–7) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41002) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41296) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 58090–2) Mt. Kenya, K. C. (J. Hurter) 1909.
1 (U.S.N.M. 63066) Fort Hall, K. C. (Mearns) 1909.

The series of smooth-clawed frogs from the southern Guaso Nyiro are exceptionally large for East Africa. The biggest example (No. 40716) measures 103 mm. from snout to vent but a dozen others are but little shorter. No. 63066 has evidently been removed from the stomach of a snake and is partly digested; its own stomach holds a large quantity of hairlike algae. In captivity it is not unusual to see members of this genus seize pond weed, apparently in mistake for worms, but they usually reject it; the large quantity in this specimen appears to argue that vegetable matter may sometimes be taken intentionally. Owing to the poor state of preservation of many of the frogs in the above series their individual identification has been of necessity somewhat a matter of guesswork. The prominence, or otherwise, of the metatarsal tubercle as a means of distinguishing East African *laevis* from *muelleri* is of little assistance, as it seems to be almost equally prominent in adults of both species; in South African *laevis*, however, it is much less prominent.

##### XENOPUS MUELLERI (Peters)

*Dactylethra muelleri* PETERS, 1844, Monatsber. Akad. Wiss. Berlin, p. 37. (Mozambique.)
*Xenopus muelleri* BOULENGER, 1882, Cat. Batr. Sal. Brit. Mus., p. 457.—LOVERIDGE, 1928, Proc. U. S. Nat. Mus., vol. 73, art. 17, p. 67.

1 (U.S.N.M. 19774) Dar es Salaam, T. T. (W. Schlüter) N. D.
1 (U.S.N.M. 41502) Nairobi, K. C. (Sm. Afr. Exped.) 1909.

While the Dar es Salaam frog is quite typical, the Nairobi specimen is somewhat intermediate; neither appear to be fully adult.

BUFO REGULARIS REGULARIS Reuss

*Bufo regularis* Reuss, 1834, Mus. Senckenberg., vol. 1, p. 60 (Egypt).—Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 299.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 737.

*Bufo granti* Angel (not of Boulenger), 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12), p. 55.

2 (U.S.N.M. 16751–2) Kilimajaro, T. T. (Abbott) 1888–89.
8 (U.S.N.M. 20107, 20116–22) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 22095) Jombéni Range, K. C. (Chanler) 1892.
7 (U.S.N.M. 40691–2, 41127–8, 41151, 42943–4) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
25 (U.S.N.M. 40758–61, 42036, 42046–7, 42050–7, 42163–70, 42194, 42220, 42506) Kenya Colony. (Sm. Afr. Exped.) 1909.
49 (U.S.N.M. 40775–7, 40886–7, 40935–9, 41220–31, 41307–14, 42965–72, 42988–94) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40921) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
32 (U.S.N.M. 40940–44, 40986, 41501, 42028, 42487, 43001–6, 43069–72, 43079–91) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
5 (U.S.N.M. 41092–3, 41129–31) West side Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
6 (U.S.N.M. 41148–53) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41679) Southern Guaso Nyiro River, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41703) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41705–6) Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42001) Wiji River, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49079) Kaimosi, K. C. (Heller) 1912.
1 (U.S.N.M. 49219) Mt. Lololokwi, K. C. (Heller) 1911.
10 (U.S.N.M. 49256–65) ? Mt. Sagalla, K. C. (Heller) 1911.
1 (U.S.N.M. 49319) Top of Mt. Sagalla, K. C. (Heller) 1911.
3 (U.S.N.M. 63374–5, 63392) Lualaba River, nr. Albertville, B. C. (Raven) 1920.
1 (U.S.N.M. 63554) Malmani Oog, Transvaal. (Raven) 1919.
2 (U.S.N.M. 66908–9) Between Abyssinia and K. C. (Mearns) 1912.

This splendid series, albeit the specimens are rather dried, exhibits an almost incredible amount of variation and yet no topographical significance can be detected sufficient to warrant one in attempting to define geographical races; in every case the extreme types appear to form part of a series in which the more typical form also appears.

Under the name of *Bufo regularis gutteralis*, Power [40] has recently described a race from Lobatsi on the border of Bechuanaland, South Africa. I agree with him in recognizing it on account of the call notes of the males, which he found to differ very markedly from that of the common *regularis* which is widespread in South Africa. It is also slightly smaller in size, 30 examples of *gutteralis* averaging 11 mm. less than in 30 specimens of the typical form. In the webbing of the toes East African toads agree with typical *regularis*, for the webbing does appear to be more or less prolonged as a border to

[40] Power, 1927, Trans. Roy. Soc. S. Africa. vol. 14, p. 416, pl. 21, fig. 2.

the extremities which Power states is not the case in *gutteralis*. On the other hand, I find that the characters by which he differentiates the new form are well within the range of variation of East African *regularis*. I regard the horny spines tipping the tubercles in *gutteralis* as a breeding character, probably the dark-brown tips of the fingers also; both are present and absent in large numbers of the series before me. As a matter of fact the common square-marked toad of East Africa is of the slender-fingered type which Power has figured and to which he gives the name of *gutteralis*, and the second specimen which I picked up (No. 40986 from Nairobi) has the *gutteralis*-shaped parotoid, its width being clearly contained three times in its length; the size of these glands has a very wide range of variation in the series brought back by the Smithsonian East African Expedition.

It may be, of course, that *Bufo regularis gutteralis* also occurs in East Africa in the same pools as *B. r. regularis*, as was the case at Lobatsi, but without hearing their call notes—and the series before me maintains a conspiracy of silence—I can not distinguish them with reasonable certainty.

Through the courtesy of Monsieur Angel I have been able to examine the toad on which he based his record of the occurrence of the South African *Bufo granti* Boulenger on Mount Kenya at an altitude of between 1,500 and 2,000 meters. I have compared it with some of the actual cotypes (M. C. Z. 3223–4) of *B. granti*, a species which was referred to the synonymy of *B. gariepensis* Smith by Hewitt and Power,[41] and have no hesitation in referring the Kenya toad to *B. r. regularis*. Eight toads in the above series (Nos. 41128–30, 41222, 41224, 41448, 49262–3) present a striking resemblance to these cotypes of *B. granti*, as well as to other *gariepensis* in the Museum of Comparative Zoölogy, in their rather uniform clay color with an absence of markings except on the snout and limbs and in one individual (No. 41129) in which may be distinguished the head markings and light dorsal line of *regularis*. They also agree in their general smoothness and flattened tubercles, though how far preservation, packing, and friction might be responsible for this condition it is difficult to say. The character of the first finger being just longer than the second (as in *gariepensis*) to appreciably longer (*regularis*) is of no assistance in identifying them, for both conditions occur; that is to say, they may be matched with known examples of either species in this respect. They may, however, be readily distinguished from *gariepensis* by the webbing of the fourth toe reaching the base of the last phalanx but two (that is, there are three terminal phalanges of this toe free), for in *gariepensis* the webbing does not extend even thus far. The tarso-metatarsal tubercle of the

[41] Hewitt and Power, 1913, Trans. Roy. Soc. S. Africa, vol. 3, p. 174.

adpressed hindlimb in *gariepensis* (including *granti*) reaches from the tympanum to the eye while in these *regularis* it reaches from the eye to the end of the snout or just beyond.

It is difficult to imagine such extremely warty and spinose types as Nos. 40921 and 42028 representing the same species as the aforementioned smooth specimens, but individuals intermediate in wartiness between these two extremes and more typical *regularis* may be found in Nos. 22095, 41093, 41313, 42050, 42988. It is interesting to note, however, that all the extremely warty toads come from the vicinity of Mount Kenya.

In size the series ranges from a 14-mm. toad (No. 41151 taken between Mount Kenya and Fort Hall, October, 1909) and a 108-mm. female (No. 41679 from the Southern Guaso Nyiro).

#### BUFO POLYCERUS Werner

*Bufo polycerus* Werner, 1897, Sitzber. Akad. Wiss. München, vol. 27, p. 211. (Cameroons.)

*Bufo latifrons* Boulenger, 1900, Proc. Zool. Soc. London, p. 435, pl. 27, fig. 1. (Benito River, Gaboon).—Angel, 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeanel en Afrique Orientale (1911–12), p. 51.

I have just examined the 60-mm. dried toad which was taken on Mount Kinangop, Kenya Colony (P. M. No. 24–48) and which was referred to *B. latifrons* by Monsieur Angel. *B. latifrons* was long ago referred to the synonymy of *B. polycercus* and I have compared the Kinangop toad with Cameroon examples of the latter in the collection of the Museum of Comparative Zoölogy and consider that they represent one species.

Monsieur Angel's record is, therefore, the first of the occurrence of this very spinose toad in East Africa and makes one more interesting addition to the list of Cameroon species occurring on isolated mountain peaks in the eastern part of the continent.

#### BUFO CARENS Smith

*Bufo carens* Smith, 1849, Illustr. Zool. S. Africa, vol. 3, pl. 68, fig. 1 (Interior of Africa).—Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 301 (part).

3 (U.S.N.M. 63527–9) Kafue River, Rhodesia. (Raven) 1919.

Two of these toads (Nos. 63527–8) lack the pair of spots in the lumbar region which are so characteristic of the species. It is occasionally absent in specimens from Tanganyika Territory. The same animals, which I presume are males, have minute, black spines scattered over the whole dorsal surface as far forward as the occipital region. On referring to the pair of Kilosa toads taken in embrace,[42] I observe that these spines are well developed in the male, scarcely distinguishable in the female. The largest of the three Kafue River toads (No. 63528) measures 83 mm.

[42] Loveridge, 1925, Proc. Zool. Soc. London, p. 769.

#### BUFO MOCQUARDI Angel

*Bufo mocquardi* Angel, 1924, Bull. Mus. Hist. Nat. Paris, p. 270 (Mt. Kenya, Kinangop and vicinity, K. C.); 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12), p. 56, pl. 3, fig. 6.

4 (U.S.N.M. 40975–6, 41676, 43007) Mt. Kenya, K. C. (Mearns and Loring) 1909.
1 (U.S.N.M. 41793) Wambugu, K. C. (Mearns) 1909.

All five toads are females and were taken at 5,300 feet at Wambugu and between 8,500 and 10,000 feet on Mount Kenya on October 4, 11, and 22, at which time they have the ovaries very distended with spawn. The species is a very distinct one though so recently described. While three exhibit markings similar to those in Monsieur Angel's figure, those of another are somewhat reminiscent of the markings of *B. regularis*, while a fifth is colored uniformly muddy brown. Only the most trifling variations from the original description are presented in this series; thus the snout is slightly *longer* than the orbital diameter; the interorbital space is narrower than, or equal to, as well as "broader than," the upper eyelid. The stomach of the only specimen examined held many reddish ants and the remains of a few beetles.

## Family RANIDAE [43]

### Genus RANA Linnaeus

#### RANA ADSPERSA (Duméril and Bibron)

*Pyxicephalus adspersus* Duméril and Bibron, 1841, Erpét. Gén., vol. 8, p. 444. (South Africa.)
*Rana adspersa* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 33, text fig.

2 (U.S.N.M. 42038–9) Kenya Colony. (Sm. Afr. Exped.) 1909.

A small 34-mm. young one and a half-grown 77-mm. female whose distended stomach held a large millipede, a caterpillar, and remains of carabid beetles, besides those of several orthoptera.

#### RANA DELALANDII (Duméril and Bibron)

*Pyxicephalus delalandii* Duméril and Bibron, 1841, Érpét. Gén., vol. 8, p. 445, pl. 87, figs. 1, 1*a* and 1*b*. (South Africa.)
*Rana delalandi* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 31.

1 (U.S.N.M. 66895) Gato River near Gardula, Ethiopia. (Mearns) 1912.

A very dried 35-mm. frog with typical markings and characteristics. The species has an extensive range from South Africa to Eritrea.

[43] Noble has proposed (1927) the name Polypedatidae for certain genera of frogs here included under Ranidae as the proposed division appears to be an unnatural one. Polypedatidae would include *Megalixalus*, *Hyperolius*, *Chiromantis*, and *Leptopelis* mentioned in this paper.

RANA ABERDARIENSIS Angel

*Rana aberdariensis* Angel, 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R Jeannel en Afrique Orientale, (1911–12), pp. 42–46, pl. 2, figs. 1 and 2. (Mt. Kinangop, Aberdare Mtns., Kenya Colony.)

12 (U.S.N.M. 40689, 40711–12, 40732–4, 40973–4, 41006, 43008–10) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.

11 (U.S.N.M. 41337–47) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.

33 (U.S.N.M. 41714–41, 41752, 41761, 41765, 41772, 41792) Wambugu, K. C. (Sm. Afr. Exped.) 1909.

7 (U.S.N.M. 43098–100, 43113, 43177, 49081, 50949) Kenya Colony. (Sm. Afr. Exped. and Heller) 1909–12.

This long series of *aberdariensis* convinces me that the species is recognisable and that I was in error when, with my colleague,[44] we placed it in the synonymy of *Rana nutti*. At that time we had not seen a male and overlooked the significance of the author's statement that his single male "pourvu de plis de peau trés minces, de chaque cote de la gorge pour la sortie des sacs vocaux." I find that the males may be distinguished readily from those of either *nutti* or *fuscigula* by the sides of the throat being dark blue grey over the small skin folds of the vocal sac region; moreover, in males of *aberdariensis* the center of the throat is always white while in *nutti* it is rarely white, for it is usually mottled; in *fuscigula* it is apparently always mottled.

Whereas Angel had only a single male and four adult females the above series is comprised of 31 males but only 9 females. The suggestion that at the time the series was collected the males had assembled in the pools but that the females had only begun to arrive can not be maintained in view of the numerous young also collected, unless the breeding season is an extensive one. It may be observed that at least one female was received from each locality. Naturally, the great preponderance of females over males in the series of *nutti* raised doubts as to whether or not some *aberdariensis* females had not been included in error. This is not the case, for it was discovered that besides the shorter leg length of *aberdariensis* the two species may be sorted on the basis of the vomerine teeth which in *aberdariensis* are in two small round groups but in *nutti* are in elongate series. This character is a little difficult to gauge without practice in a large series and I have found it of no use in trying to separate the young of these two species.

Males may be readily distinguished from the females by the swollen base of the first digit, a critical examination of the series of 31 males shows a range in length from 46 to 58 mm., with an average of 50.8 mm. Other characters may be listed serially as follows:

[44] Barbour and Loveridge, 1928, Mem. Mus. Comp. Zool., vol. 50, p. 191.

1. Lateral gular pouches invariably present, their position indicated by blue grey patches.

2. Center of throat invariably immaculate.

3. The tibio-tarsal articulation of the adpressed hind limb does not usually extend beyond the end of the snout; it only reaches the eye in one frog (No. 41729), the nostril in 12, the end of snout in 11, and a trifle beyond the end of the snout in the remaining 7.

4. A hitherto unnoticed character, undoubtedly representing a breeding season adaptation, is that 29 frogs of the series have minute spiny tubercules on the whole of the dorsal surface, including the limbs and flanks; also on a broad band across the hinder part of the belly. The two exceptions are the two smallest males measuring 46 and 48 mm., respectively.

The nine females show a range in length from 40 to 70 mm., with an average of 52.5 mm. Using the same notation for the male characters noticed above, it may be remarked that—

2. The center of the throat is immaculate in the five youngest but is more or less marbled in the four largest females.

3. The tibio-tarsal articulation of the adpressed hind limb reaches the eye in 4 frogs, the nostril in 4, and the end of the snout in 1 (No. 41728).

4. The breeding spinosities of the males are faintly represented in two of the females but do not occur on the belly. They are most numerous on No. 49081, which is distended with ova.

The 23 young show a range in length from 19 to 39 mm.; the larval tails in various stages of absorption are present in specimens between 19 and 26 mm.

2. The center of the throat is white in every specimen.

3. The tibio-tarsal articulation of the adpressed hind limb reaches the eye in 5 frogs, the nostril in 17 and the end of the snout only in 1 (No. 43099).

It might be added that any frog under 40 mm. was reckoned as young; it would perhaps have been better to consider anything under 46 mm., as that was the size at which the swollen thumb of the male is distinguishable; it may be that a few juvenile males between 40 and 45 mm. are included in the series of females.

A butterfly, a caterpillar, and a weevil were in the gullet or stomach of one specimen examined.

#### RANA NUTTI Boulenger

*Rana nutti* Boulenger, 1896, Ann. Mag. Nat. Hist., ser. 6, vol. 18, p. 467.—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 194.

1 (U.S.N.M. 39436) Kibosho, T. T. (Danzenberger) 1906.
37 (U.S.N.M. 40684–6, 41004, 41152, 41935–56, 41958, 42948–56) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.

1 (U.S.N.M. 40693) Meru, K. C. (Sm. Afr. Exped.) 1909.
12 (U.S.N.M. 40735, 41096–103, 41105, 41107–8) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
11 (U.S.N.M. 40762–5, 41503–4, 41506–7, 41509–11) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
46 (U.S.N.M. 40770–4, 41009–10, 41209–19, 41255–73, 42973–6, 42980–7) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
25 (U.S.N.M. 41421–39, 41441–6) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 42058–60) Kenya Colony. (Heller) 1911–12.
8 (U.S.N.M 49266–73) ? Sagalla, K. C. (Heller) 1911–12.
1 (U.S.N.M. 65912) Kasorongai River, K. C. (Mearns) 1909.

The above series consists of 42 males, 91 females (possibly including some immature males also), and 15 young. I propose discussing these groups separately to facilitate comparison with similar groups of *Rana aberdariensis*.

Males may be readily distinguished from the females by the swollen base of the first digit. This series of 42 frogs gives a range in length from 35 to 55 mm.; except for a single frog (No. 40693), measuring 65 mm., the average of the whole series is 49.7 mm. Thus it will be seen that there is no appreciable difference in size between the males of *aberdariensis* and those of *nutti* from the same region; it is, however, important to draw attention to the fact that these frogs from Northern Kenya are much smaller than those from central Tanganyika Territory.[45] Other characters noticed are:

1. Lateral gular pouches always absent.

2. Center of the throat is usually spotted, in several it is very faintly so, and in 13 quite unspotted; this character appears to be quite unrelated to age or locality.

3. The tibio-tarsal articulation of the adpressed hind limb usually extends well beyond (5 to 15 mm.) the end of the snout; in only one frog (No. 49271) does it only reach the level of the snout.

4. Minute spinosities are present on the back and flanks but do not extend in a band across the belly as in *aberdariensis*.

The 91 females show a range in length from 40 to 75 mm.; except for a single frog (No. 40770), measuring 95 mm., the average of the whole series is 54.2 mm. They also average much smaller than the females in the large series from central Tanganyika Territory.

2. Center of the throat is usually spotted; thus 73 have spotted throats; 7 are very faintly so; 11 are unspotted.

3. The tibio-tarsal articulation of the adpressed hind limb usually reaches well beyond the end of the snout, but there are a few exceptions; thus in No. 49269 it only reaches the end of the snout, and in Nos. 41436 and 41444 only to the nostril.

4. The breeding spinosities of the females are faintly represented; that is, as compared with the males.

[45] Mem. Mus. Comp. Zoöl., vol. 50, p. 196.

The 15 young show a range in length from 25 to 37 mm., with an average of 30.2 mm.; very small stumpy rudiments of larval tails are present in four frogs, measuring 26, 27, 28, and 29 mm., respectively.

2. The center of the throat is mottled in all but three frogs (Nos. 41219, 41273, 42956), where it is plain.

3. The tibio-tarsal articulation of the adpressed hind limb reaches beyond the end of the snout except in three frogs; in one of these (No. 41105) it reaches to the end, while in two others (Nos. 41958, 42956) it only reaches the nostril.

As to this last-mentioned frog (No. 42956) I am not certain that it should not be referred to *aberdariensis* for in a third feature—the roundish vomers—it seems allied to that species, I have hesitated to do so chiefly because other young in the same series, as well as the adults, are all obviously *nutti*.

A reexamination of the 192 examples of *Rana nutti* from Tanganyika Territory [46] show that these were all correctly identified as *nutti*, and that, while the tibio-tarsal articulation of the adpressed hind limb reaches beyond the end of the snout in four-fifths of the series, in the remaining fifth—principally composed of younger individuals—it only reaches the nostril or end of snout. Under the heading of *Rana aberdariensis* I have already given reasons for now considering that species distinct. The separating of specimens being by no means easy it might be well to summarize these conclusions in the form of a simple key. Apart from the vomers which are rounded in *aberdariensis* and elongate in *nutti* the differences may be summarized thus:

MALES

In specimens over 46 mm. the center of throat is always immaculate; laterally a blue-gray patch over folds of vocal pouches; a band of minute spinosities across the belly in breeding season; the tibio-tarsal articulation does not usually reach beyond the end of the snout (range from eye to beyond end of the snout)---------- aberdariensis.

In specimens over 35 mm. the center of throat is usually mottled (quite often not); no blue-gray patch or lateral vocal pouches; no band of minute spinosities across the belly in the breeding season; the tibio-tarsal articulation almost always reaches well beyond the end of the snout (range from end of snout to beyond)---------- nutti.

FEMALES

Center of throat mottled or plain; the tibio-tarsal articulation rarely reaches beyond the nostril (range from eye to end of snout)---------- aberdariensis.

Center of throat more often mottled than plain; the tibio-tarsal articulation usually reaches well beyond the end of the snout (range from nostril to beyond end of snout)---------- nutti.

[46] Mem. Mus. Comp. Zoöl., vol. 50, p. 194.

YOUNG UNDER 40 MM. LONG

Center of throat white; the tibio-tarsal articulation rarely reaches beyond the nostril (range from eye to end of snout)----------aberdariensis.
Center of throat almost always mottled; tibio-tarsal articulation usually reaches beyond the end of the snout (eye to beyond the end of the snout)------nutti.

RANA OXYRHYNCHUS Smith

*Rana oxyrhynchus* Smith, 1849, Illustr. Zool. S. Africa, vol 3, pl. 77, figs. 2 and 2*a–c*. (Kafirland and region of Port Natal).—Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 51.

*Rana aequiplicata* Angel (not of Werner), 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12). Paris, p. 40. (Mombasa Id.; Bura; Waki River, K. C.)

3 (U.S.N.M. 22098–100) Jombéni Range, K. C. (Chanler) 1892.
6 (U.S.N.M. 40727–8, 40945–6, 41505, 41508) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 40884) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41686, 41802) Southern Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 42173–4) Rhino Camp, L. E. (Sm. Afr. Exped.) 1910.
14 (U.S.N.M. 49233–46) Mount Gargues, K. C. (Heller) 1911.
2 (U.S.N.M. 49406) Kenya Colony. (Heller) 1911–12.
1 (U.S.N.M. 57521) Tanganyika Territory. (Hurter) N. D.

The masculine character of a swollen first digit is of little assistance in separating the sexes in either *R. oxyrhynchus* or *R. mascareniensis*. For these frogs a much more useful external character may be found in the slit at the angle of the jaw of males; this slit being provided for the extrusion of the vocal sack. It was found that this slit is discernible in males of 27 and 28 mm. in length, so that only frogs of less dimensions than these have been reckoned as young.

The 10 males range from 27 to 41 mm. in length, with an average of 37.3 mm. The 19 females range from 34 to 40 mm., with an average of 43 mm. The single young one measures 22 mm. No. 22100 has obviously been recoverd from a snake's stomach.

Monsieur Angel has kindly permitted me to examine one of the series of frogs which, in 1925, he referred to the Cameroon species known as *R. aequiplicata*. The frog in question (P. M. 23.193) was taken on the Waki River to the east of Lake Albert Nyanza. It measures 35 mm. and appears to me to be a juvenile female *R. oxyrhynchus*, a species in which there is a good deal of sexual variation. Laid upon its back side by side with a Transvaal frog (M. C. Z. 7252) and Nairobi (M. C. Z. 10340) specimen of *oxyrhynchus* they will be seen to agree in the projection of the snout beyond the anterior margin of the lower jaw; also in the slight trace of marginal webbing on the penultimate phalanx of the fourth toe. The markings and permanent coloring are essentially the same.

When compared with adult *R. aequiplicata* (M. C. Z. 2652) from Efulen, Kribi, Cameroons, and M. C. Z. 12843 from Benito River, Cameroons, it differs in the projection of the snout which, in *aequiplicata*, is rounded and scarcely projects; moreover, the webbing on the penultimate phalanx of the fourth toe in *aequiplicata* extends broadly to half way up the phalanx, not merely as a narrow margin. The configuration of the snout in the region of the canthus rostralis also differs considerably. In the matter of coloring, however, it would be almost impossible to find two frogs so closely in agreement, spot for spot and marking for marking, as these three frogs from Nyanza and the Cameroons.

The identification of this *R. oxyrhynchus* with *R. aequiplicata* has, therefore, served a most useful purpose in drawing attention to their similarities; it seems more probable, if the extent of the webbing on the fourth and fifth toes is a good criterion, that *aequiplicata* is more likely to be a race of *oxyrhynchus* Smith than of *mascareniensis* Duméril and Bibron, though Werner described it as *Rana mascareniensis* var. *aequiplicata*.

### RANA MASCARENIENSIS Duméril and Bibron

*Rana mascareniensis* Duméril and Bibron, 1841, Erpét. Gén., vol. 8, p. 350. (Seychelles, Mauritius, Bourbon).—Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 52 (part).—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 738.

1 (U.S.N.M. 16026) East Africa. (Abbott) 1888–89.
10 (U.S.N.M. 40687–8, 41154–5, 41957, 41959–61, 42945, 42947) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41008) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
13 (U.S.N.M. 41011, 41206–8, 41290–5, 42977–9) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 41110–2) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
21 (U.S.N.M. 41440, 41454–73) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41906, 42004) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
13 (U.S.N.M. 49274–86) ? Sagalla, K. C. (Heller) 1911.
9 (U.S.N.M. 49310–8) Top of Mt. Sagalla, K. C. (Heller) 1911.

The slit at the angle of the jaw in males was discernible in a 35-mm. frog, so that only specimens of less dimensions have been considered as young, and those above 35 mm. without a slit are assumed to be females.

The 23 males range from 35 to 55 mm. in length, with an average of 45.6 mm. The 43 females range from 35 to 62 mm., with an average of 47 mm. The seven young range from 26 to 34 mm., with an average of 30 mm.

Of the total of 73 frogs only 7 have spotted throats, 4 are intermediate, and the rest immaculate. There is a fine hairlike light line

on the tibiae of all except 21, and it is noticeable that it is only lacking in young ones except for No. 49311, which is an adult female measuring 55 mm.; as this line is not present in any of the specimens of *R. oxyrhynchus* it is of some slight diagnostic assistance

The whole series agree in having the interorbital space narrower, or equal to, the upper eyelid; this precludes their being referred to *R. venusta* Werner, which is said to have the interorbital space broader than the upper eyelid and the head broader than in *mascareniensis*, a species with which it appears to agree in all other respects.

RANA MASCARENIENSIS variety

1 (U.S.N.M. 42946) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.

My object in isolating this individual, a 45-mm. breeding female, from the rest of its series is to draw attention to the several points in which it differs from the rest of the series. It need not be supposed that it is anything else but a mutant of *mascareniensis*. Besides its most unusual coloration the principal differences between it and the rest of the series are (1) the interorbital space is much broader than the upper eyelid, 3.25 and 2.25 mm. respectively; (2) only two basal joints of the second, third, fourth, and fifth toes webbed, whereas in the fifth the rest of the series have three basal joints webbed; (3) dorsal glandular folds very indistinct though the dorso-lateral pair are strongly marked. An examination of the large series of *mascareniensis* in the Museum of Comparative Zoology shows that all of these characters may occur in otherwise typical frogs. It might be added that a cotype of *mascareniensis* has the interorbital space slightly wider than the upper eyelid.

RANA FASCIATA MERUMONTANA (Lönnberg)

*Rana merumontana* Lönnberg, 1907, in Sjöstedt, Kilimanjaro-Meru Exped., vol. 1, pt. 4, p. 21, pl. 1, figs. 4*a* and 4*b*. (Mt. Meru, Tanganyika Territory.)

*Rana fasciata* Angel (not of Duméril and Bibron), Reptiles et Batraciens, 1925, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912). Paris, p. 46. (Kilimanjaro, Tanganyika Territory.)

*Rana fasciata merumontana* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 197. (Phillipshof, Usambara Mountains, T. T.)

2 (U.S.N.M. 76868) Phillipshof T. T. (Loveridge) 1926.

Through the courtesy of Monsieur Angel I have been able to examine one of the frogs (P. M. 24.14) from Kilimanjaro, which he referred to *R. fasciata* of South Africa. It measures 46 mm. and agrees essentially with a frog of the same length from Phillipshof, Usambara Mountains, Tanganyika Territory, which I consider identical with Lönnberg's *merumontana*. The distinguishing features of the East

African mountain race which separate it from the South African species have been recently discussed [47] and so need not be repeated here.

Monsieur Angel's specimen shows us that this frog occurs on Kilimanjaro as well as on Mount Meru and in the Usambara range; all three are situated in northern or northeastern Tanganyika Territory. I have not seen the frog from Kilimanjaro which Angel [48] himself refers to *R. merumontana*.

### Genus PHRYNOBATRACHUS Günther

#### PHRYNOBATRACHUS NATALENSIS (Smith)

*Stenorhynchus natalensis* Smith, 1849, Illustr. Zoöl. S. Africa, vol. 3, Appendix, p. 24. (Port Natal.)

*Phrynobatrachus natalensis* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 112.

1 (U.S.N.M. 41203) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41366) Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 43176) Kenya Colony. (Sm. Afr. Exped.) 1909.
3 (U.S.N.M. 49321–3) Mt. Sagalla, K. C. (Heller) 1911.
14 (U.S.N.M. 66910–23) Abyssinia to K. C. (Mearns) 1912.

The series consists of 10 males, ranging from 24 to 33 mm. in length, with an average of 29 mm., and 9 females, ranging from 25 to 34 mm., with an average of 29.4 mm. The largest series is so poorly preserved that conclusions drawn from them would be doubtfully reliable.

#### PHRYNOBATRACHUS ACRIDOIDES (Cope)

*Staurois acridoides* Cope, 1867, Journ. Acad. Nat. Sci. Phila., vol. 6, p. 198. (Zanzibar.)

*Phrynobatrachus acridoides* Boulenger, 1882, Cat Batr. Sal. Brit. Mus., p. 113.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 738.—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 203.

2 (U.S.N.M. 20101–2) Tana River, K. U. (Chanler) 1892.
1 (U.S.N.M. 39481) Gondokoro, Uganda. (Sm. Afr. Exped.) 1910.
2 (U.S.N.M. 42186–7) no locality. (Sm. Afr. Exped.) 1909–10.
1 (U.S.N.M. 63533) Victoria Falls, Zambezi. (Raven) 1919.

The series is comprised of three adults, ranging from 24 to 26 mm., and three young, all 17 mm. It is surprising that more specimens of this common species were not obtained by the expedition. The explanation is probably to be found in the fact that little collecting was done at the coast, where it is most numerous, the above localities would seem to indicate that it penetrates inland along the river valleys.

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[47] Mem. Mus. Comp. Zoöl., vol. 50, p. 197.
[48] Reptiles et Batrachiens, p. 46.

### PHRYNOBATRACHUS KINANGOPENSIS Angel

*Phrynobatrachus kinangopensis* Angel, 1924, Bull. Mus. Hist. Nat. Paris, p. 131. (Mt. Kinangop, Aberdare Range, in Kenya Colony.) 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12), p. 48, pl. 3, fig. 4.

50 (U.S.N.M. 41113–26, 43011–46) Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.

48 (U.S.N.M. 41156–84, 41348–54, 42957–64, 43065–8) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.

73 (U.S.N.M. 41204–5, 41315–35, 41742–51, 41753–60, 41762–4, 41766–71, 41773–91, 42996–8, 43076–7) Wambugu, K. C. (Sm. Afr. Afr. Exped.) 1909.

23 (U.S.N.M. 41474–95, 41497) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.

71 (U.S.N.M. 43101–12, 43114, 43116–23, 43125–34, 43136–75) Kenya Colony. (Sm. Afr. Exped.) 1909.

*Relations.*—*Phrynobatrachus kinangopensis*, while perfectly distinct, appears to be closely related to *P. acridoides;* in all probability it is the mountain representative of the latter. It is a more slender frog, though this readily observable difference is apt to be masked in the case of females distended with ova. The readiest method of distinguishing them is by the length of the lower jaw in relation to its width; in *kinangopensis* the length, measured from its apex to one of the angles of the mouth, is equal to the distance in a straight line between the two angles; in *acridoides* the length is not nearly equal to the breadth. In *acridoides* the third and fifth toes are webbed to the disks, while generally speaking in *kinangopensis* these two toes have the last phalanx free of web; in occasional specimens, however, the web may persist as a very narrow margin to the disks or almost to the disks. The undersurface in *kinangopensis* is usually uniformly creamy-white, while in *acridoides* the throat at least is almost always finely speckled; occasionally, however, there is some slight speckling on the under parts of *kinangopensis*. The skin fold extending over the tympanum and almost to the shoulder has below it a characteristic brown streak in *kinangopensis*.

*Variation.*—Even with so long a series before me I find little to add to Monsieur Angel's detailed description of this frog. Actually, the snout, as measured from the anterior border of the eye, is a trifle longer than the orbital diameter. As in *acridoides* there is a good deal of variation in the degree of expansion of the tips of both fingers and toes, digital disks may be present or absent. A striking feature of this species is the uniformity in leg length which, in every one of a hundred specimens examined and including both sexes, has the tibiotarsal articulation marking the eye. The skin is not always smooth; in some (No. 41121, for example) it is distinctly warty and glandular; in others the presence of minute spines may be detected, almost

certainly a breeding-season character. As already indicated, though the throats (in alcohol) are usually creamy white at times they may be spotted with brown and also with pure white.

*Measurements.*—Owing to my inability in discovering any definite method of distinguishing the sex of each specimen apart from dissection it seems of little use measuring so large a series. Fifty which were measured range from 16 to 24 mm.; the egg-bearing females undoubtedly attain to larger dimensions than the males; it might be hazarded that males probably measure from 17 to 20 and females from 21 to 24 mm.

*Breeding.*—Females distended with ova occur in every series so that we can definitely say that breeding is in progress during September and October; probably the season is a lengthy one.

*Diet.*—Apart from indeterminate insect remains the stomachs of 10 frogs examined held (1) two weevils; (2) beetles; (3) beetle, hemiptera, both adult and larvae, crane fly, caterpillar; (4) beetle, heteropteran, diptera, husk of grass seed; (5) two beetles, larval bug, drosilidlike dipteron, winged ant; (6) large beetle larva, muscid fly; (7) caterpillar; (8) caterpillar, ants; (9) hemipteron; (10) long gauzy wings (? neuropteran).

PHRYNOBATRACHUS ? OGOENSIS (Boulenger)

*Arthroleptis ogoensis* Boulenger, 1906 (for 1905), Ann. Mus. Stor. Nat. Genova, ser. 3, vol. 2, p. 162, pl. 1, figs. 7 and 8. (Lambaréne, Ogowe).—Loveridge, 1925, Proc. Zoöl. Soc. London, p. 783. (Bagilo.)

*Phrynobatrachus ? ogoensis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 205. (Bagilo and other localities in Uluguru Mountains, Tanganyika Territory.)

1 (U.S.N.M. 57720) Ukami, Tanganyika Territory. (Hurter) 1900.

This 19-mm. frog almost certainly came from the Uluguru Mountains, which is the headquarters of the Wakami tribe, Ukami merely signifying the country of the Wakami. The variations of this species have recently been discussed at length. (Barbour and Loveridge, 1928.)

PHRYNOBATRACHUS GRAUERI (Nieden)

*Arthroleptis graueri* Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 441. (Rugege Forest, Lake Region.)

*Phrynobatrachus graueri* Nieden, 1912, Wiss. Ergeb. Deutsch.-Zentr. Afrika Exped., vol. 4, p. 174, pl. 5, figs. 2*a*–*b*.

3 (U.S.N.M. 49201–2, 49391) Kaimosi, K. C. (Heller) 1912.
1 (U.S.N.M. 49456) Kenya Colony. (Heller) 1911–12.
1 (U.S.N.M. 65911) Kasorongai River, K. C. (Sm. Afr. Exped.) 1909.

The series consists of a male, two adult females, and two immature individuals. The male measures 22 mm., the adult females 27 mm., and the young from 18 to 21 mm. The tibio-tarsal articulation of the adpressed hind limb reaches to the eye (male and one young), to the nostril, or between eye and nostril.

As far as I am aware these constitute the first authentic records of the occurrence of this species in Kenya Colony; one such that has appeared was based on a confusion of this species with *Arthroleptis minutus* as recorded below under that name. An example from the Yala River (M. C. Z. 12839), however, was received from the British Museum several years ago and agrees with a long series from the lake region collected by Dr. J. Bequaert for the Museum of Comparative Zoölogy.

The stomach of one of these frogs held ants, a beetle, a staphylinid beetle, a cockroach, and a spider. Another specimen exhibits subdermal parisitization of the thighs by a larval mite.

### Genus ARTHROLEPTIS Smith

#### ARTHROLEPTIS MINUTUS Boulenger

*Arthroleptis minutus* Boulenger, 1895, Proc. Zool. Soc. London, p. 539, pl. 30, fig. 4. (Durro, western Somaliland).—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 216. (Amani and Phillipshof, Usambara Mtns., Tanganyika Territory.)

*Arthroleptis scheffleri* Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 438. (Nairobi and Kibwezi, Kenya Colony; Mpwapwa, Tanganyika Territory; Zanzibar.)

*Arthroleptis albifer* Ahl, 1924, Archiv. für Naturg. vol. 90, p. 251. (Usaramo, German East Africa = Dar es Salaam District, Tanganyika Territory).

*Arthroleptis graueri* Angel (not of Nieden), 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12). Paris, p. 54. (Mt. Kinangop, Kenya Colony.)

2 (U.S.N.M. 39482, 39484) Gondokoro, U. (Sm. Afr. Exped.) 1910.
1 (U.S.N.M. 41496) Mt. Kenya Trip, K. C. (Sm. Afr. Exped.) 1909.
9 (U.S.N.M. 49247–55) Mt. Gargues, K. C. (Sm. Afr. Exped.) 1909.
43 (U.S.N.M. 49324–66) Mt. Sagalla, K. C. (Heller) 1911.
1 (U.S.N.M. 63534) Victoria Falls, Zambezi. (Raven) 1919.

The Sagalla series consists of 33 males, ranging in length from 14 to 16 mm., with an average of 15.3 mm.; 10 females, ranging from 15 to 20 mm. with an average of 17.5 mm. The 11 others are of doubtful sex, being mostly juvenile; they range from 10 to 18 mm., with an average of 14.1 mm.

It is not always easy to sex representatives of this species without resorting to dissection, but the Mount Sagalla series have evidently been taken at breeding time, for each of the 10 females may be recognized by the ova which are visible through the abdominal wall; in addition it might be observed that the center of their throats lack the baggy appearance due to the vocal pouch of the males; moreover, the throats of the males are usually, though not invariably, darkly pigmented, something like those of the males of *Phrynobatrachus natalensis*. If one compares the snouts of sexed specimens it will be noticed that those of the males are more pointed than those of the females, which

are somewhat bluntly rounded, a difference of considerable importance. Breeding females are rarely as small as the males; at least none of the Mount Sagalla females are under 17 mm. in length.

The Mount Sagalla series show remarkable uniformity in leg development, the tibio-tarsal articulation of the adpressed hind limb marking the eye (or a trifle behind or before) in 41 frogs, the two exceptions are both females (Nos. 49324, 49327), where it only reaches the axilla or tympanic region (the tympanum is hidden in this species). In the Gondokoro and Mount Gargues specimens, with one exception, the articulation reaches the nostril; the exception (No. 49251) and the Mount Kenya and Victoria Falls frogs show a slightly longer limb where the articulation reaches the end of the snout. In all the specimens the interorbital space is noticeably broader than the upper eyelid.

In coloration the Mount Sagalla series is reasonably uniform; only two frogs have a trace of a vertebral line; in No. 49336 (female) it is a broad band, 3 mm. in width; in No. 49357 (male) it is only 1 mm. wide, agreeing in this respect with the frog from Victoria Falls; a hairlike vertebral line is present in the Mount Kenya frog as well as one from Gondokoro and a Mount Gargues specimen. Two of the Mount Gargues series have very broad vertebral bands. Three of the Sagalla males (Nos. 49358, 49360, 49366) show a large light spot on the middle of the head; in its center is a dark triangular mark which occurs in other members of the genus; a second light spot, dark-edged anteriorly, occupies the center of the back.

The material in the Museum of Comparative Zoölogy has been reexamined with a view to throwing further light on the variation of this species and the possible validity of the two forms now relegated to the synonymy. The essential information may be briefly summarized as follows:

| Material | Locality | Length | Tibio-tarsal articulation | Condition of the dorsal skin |
|---|---|---|---|---|
| 1 | Kisumu | 16 | Front of eye | Flat warts. |
| 7 | Nairobi | 15–18 | Eye to in front of eye | One very warty, rest slightly so or quite smooth. |
| 1 | Frere Town | 14 | Front of eye | Smooth. |
| 8 | Phillipshof | 13–20 | Eye to in front of eye | Generally smooth except for flattish warts on nape. |
| 9 | Amani | 17–20 | do | Smooth except for parotoids and long flat warts. |
| 30 | Dar es Salaam | 11–16 | Eye to the tip of snout | Smooth except for flat glandular warts. |
| 1 | Kilosa | 12 | Front of eye | Smooth. |
| 2 | Victoria Falls | 11–12 | Eye to the tip of snout | Mostly smooth, some warts distinguishable. |

Of the two closely related species described from East Africa, *A. albifer* is only known from the type, and unfortunately it has been

impossible to obtain cotypes of *A. scheffleri* by exchange. There is, however, topotypic material of both species in the Museum of Comparative Zoölogy. These are from Dar es Salaam and Nairobi; it might be observed in passing that Lönnberg and others have already reported *A. minutus* from Nairobi, and Boulenger himself confirmed the identification of these Nairobi frogs as *minutus*. For convenience of comparison it seems best to give the authors' original descriptions in tabular form. The somewhat lengthy color descriptions, which are of little significance, have been omitted.

| Species | Material | Length of type (m. m.) | Tongue with a— | Head | Snout |
|---|---|---|---|---|---|
| *A. minutus* | Single male | 16 | Free papilla | Moderate, as long as broad. | Rounded; shorter than the diameter of the orbit. |
| *A. scheffleri* | 169 specimens | 22 | Conical papilla | | Short, blunt, as long as the diameter of the eye. |
| *A. albifer* | 1 specimen | 14 | No papilla | | Rather long, pointed longer than the diameter of the eye. |

| Species | Canthus rostralis | Male throat with— | Nostril | Interorbital space | Tympanum |
|---|---|---|---|---|---|
| *A. minutus* | Rounded | Vocal sack | | | Hidden. |
| *A. scheffleri* | | | Midway between eye and snout. | About as wide as upper eyelid. | Do. |
| *A. albifer* | | | Closer to end of snout than to eye. | Wider than upper-eyelid. | Do. |

| Species | Fingers and toes | First finger | Toes | Tarsal tubercle |
|---|---|---|---|---|
| *A. minutus* | Blunt | Shorter than second. | Webbed at the base, the web extending as a fringe to the tip. | Present. |
| *A. scheffleri* | Very slightly dilated | Very little shorter than second. | Distinctly webbed at the base. | Do. |
| *A. albifer* | Not dilated, scarcely swollen. | Shorter than second. | A trace of webbing at the base. | Do. |

| Species | Metatarsal tubercle | Tibio-tarsal articulation | Tarso-metatarsal articulation | Skin |
|---|---|---|---|---|
| *A. minutus* | A small oval inner | Reaches posterior border of the eye. | | Smooth. |
| *A. scheffleri* | 2 metatarsal tubercles closer together than is the inner from the tarsal. | Reaches to the eye | Reaches between eye and end of snout. | Smooth on back with warts of different sizes. |
| *A. albifer* | do | Eye or tip of snout | | Smooth on back with numerous flat, round glandular warts. |

A perusal of these descriptions impresses one with the remarkably few differences of other than sexual significance. It is true that *A. albifer* is said to lack a papilla on the tongue but as already remarked [49] in the case of *A. stenodactylus* where the preservation is not perfect it is frequently next to impossible to detect any projection of the papilla above the slight depression in which it lies. The pointed or blunt character of the snout is sexual and not specific, and the measurements of the types of *A. scheffleri* (female) and *A. albifer* (male?) tend to support this contention. When Boulenger said of *minutus* "snout shorter than the diameter of the orbit," I take it that he meant from the nostril to the end of the snout as "snout" while "*albifer's*" snout is evidently measured from the anterior border of the eye. In *minutus* and *albifer* the interorbital space is wider than the upper eyelid while *A. scheffleri* is said to have it "about as wide." Boulenger described the webbing of *minutus* as extending as a narrow fringe to the tip of the toes. While a very close examination shows this to be actually the case it is not obvious and is rather misleading.

Recently Angel has recorded "*Arthroleptis graueri* Nieden" from Mount Kinangop, Kenya Colony on the basis of a single 19 mm. frog (P. M. 24–21). Personally I consider *graueri* more closely related to those species of *Phrynobatrachus* which exhibit a rather lyre-shaped glandular ridge on the anterior part of the back, than to *Arthroleptis*. Nieden also, though first describing it as an *Arthroleptis* later referred it to *Phrynobatrachus*. Angel, however, says, that he considers it an *Arthroleptis*. At my request he very kindly loaned me the frog for examination.

I consider that this Kinangop frog is undoubtedly an *Arthroleptis* though not *graueri* but *minutus* and have compared it with examples of *minutus* from Phillipshof, Usambara Mountains, Tanganyika Territory, which Mr. H. W. Parker very kindly compared with the type of *minutus* in 1928.

In this connection I might add that Dr. G. K. Noble dissected an Amani specimen of *minutus* and found that it had an *Arthroleptis*-like short cartilaginous sternum and that the omosternum was only moderately forked.

A comparison of *P. graueri* with *A. minutus* shows that the former is a much larger frog with larger feet, greater amount of webbing, better developed disks, and usually (though this character may be masked in ill-preserved specimens) exhibits the raised converging, then diverging, glandular ridges which proceed from a point behind the eye and extend posteriorly to the middle of the back.

[49] Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 209.

I am not aware of any earlier record of *A. minutus* from the Zambezi than this specimen taken by H. C. Raven in 1919; that it occurs on the southern bank of the river we know from two examples from the Victoria Falls (M. C. Z. 10989–90) taken on February 28, 1925, by W. Sprague Brooks, who definitely says that they were taken on the southern side. *A. minutus* should therefore be added to the South African fauna, its known range being from Somaliland to the Zambezi. This is an extensive distribution for so small a frog but is paralleled, or rather excelled, by that of *Phrynobatrachus natalensis*.

Two of the Mount Gargues frogs were found to have been feeding on termites.

The Mount Sagalla series are heavily infested on the posterior aspect of the thighs (occasionally on the belly also) by a small oval parasite, a larval mite, lying close to the skin but not embedded in the limb tissues.

[ARTHROLEPTIS SCHEBENI Nieden]

*Arthroleptis schebeni* NIEDEN, 1913, Sitzber. Ges. Naturf. Freunde Berlin, p. 451. (Klein Nauas, Southwest Africa.)

Under the above name, Angel [50] has recorded a small frog (P. M. No. 24–20) from Mount Kinangop, Aberdare Range, Kenya Colony. Having afforded me the opportunity of examining it I have arrived at the conclusion that it is specifically distinct from *schebeni* and apparently represents an undescribed species. On zoogeographical grounds one would scarcely expect a species from the arid regions of the southwest to be conspecific with one from the moist mountainous highlands of the northeast.

The Kinangop frog differs from *schebeni* in that its interorbital space is as wide, instead of "wider than," the upper eyelid; its toes are one-third webbed not "entirely free of web"; there is no tubercle at the base of the fourth toe, though there is a clear white spot rather like one; it is not, however, raised, let alone pointed.

It agrees in many points; the tympanum is hidden; there is certainly no tarsal tubercle; the tarso-metatarsal articulation reaches the anterior base of the forearm which may, or may not, be the case with *schebeni*. The skin is smooth. Color above is brownish with a light dorsal line; beneath it is white vermiculated with brownish on the extreme flanks and on the lower sides of the limbs; soles of feet brownish dotted with white, toes lighter. Length from snout to vent 18 mm. In a very poor state of preservation.

[50] Angel, 1925, Reptiles et Batraciens, in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12) p. 51.

## Genus MEGALIXALUS Günther

### MEGALIXALUS FORNASINII (Bianconi)

*Euchnemis fornasinii* Bianconi, 1850, Spec. Zool. Mosamb., Rept., pl. 5, fig 1. (Mozambique.)
*Megalixalus fornasinii* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 130.

1 (U.S.N.M. 12765) Southeast Africa. (Exchange British Museum.)

This frog, discolored, rubbed, and generally in a poor state of preservation, bears a very old parchment label "*Eucnemis modesta* sp. n." Günther,[51] under the name of *Hyperolius modestus*, gives us the following information but no description: "*Eucnemis modestus* (Schleg.), Nomenclat. Rept. Mus. Berol. 1856, p. 36 (without description). *a* Adult; bad state. Gold Coast. From Mr. Parrey's collection as *Eucnemis modestus*." I have also verified that the citation from Schlegel is without description. The Gold Coast frog was subsequently referred by Boulenger to *Rappia concolor* (Hallowell) and was probably not conspecific with the Southeast African frog before me.

My reference of it to the genus *Megalixalus* is necessarily somewhat arbitrary, for it is impossible to ascertain the condition of the pupil. On placing it side by side with undoubted examples of *M. fornasinii*, however, it apparently agrees with it in every detail. Its large size—36 mm.—rules out the possibility of its being *concolor* and also the majority of East African species of *Hyperolius*.

### MEGALIXALUS LOVERIDGII Procter

*Megalixalus loveridgii* Procter, 1920, Proc. Zool. Soc. London, p. 418. (Morogoro, Tanganyika Territory).—Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 227. (Dar es Salaam and localities in Uluguru and Usambara Mountains.)

1 (U.S.N.M. 57803) Ukami, Tanganyika Territory. (Hurter) 1899.

A 32-mm. example, practically topotypic of the species, for Morogoro is in the Ukami country. It bears a label *M. fornasinii*, a species with which *M. loveridgii* was long confused until separated by Miss Procter. The minute black spines which cover the upper surface of *loveridgii* immediately distinguish it from the older species.

### MEGALIXALUS FULVOVITTATUS (Cope)

*Hyperolius fulvovittatus* Cope, 1860, Proc. Acad. Nat. Sci. Phila., p. 517 (Liberia)
*Hyperolius vittiger* Peters, 1876, Monatsber. Akad. Wiss. Berlin, p. 122 (Liberia).
*Rappia fulvovittatus* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 121. (Redescribed on the basis of a single female from Duque de Bragançe, Angola which may not be conspecific with the Liberian species.)
*Megalixalus vittiger* Boulenger, 1911, Ann. Mus. Stor. Nat. Genova, ser. 3, vol. 5, p. 169. (Merely lists a specimen from Bululo, Uganda.)
7 (U.S.N.M. 24183, 24313–8) Mt. Coffee, Liberia (Currie et al.) 1897.

[51] Günther, 1858, Cat. Batr. Sal. Brit. Mus., p. 88.

The genus *Megalixalus*, solely distinguished from *Hyperolius* by a pupil that is vertical when contracted, was only proposed by Günther in 1868, therefore subsequent to Cope's description of *H. fulvovittatus*. Through the courtesy of Dr. Witmer Stone and Mr. H. W. Fowler I have been able to examine the remains of the type of *fulvovittatus* (Philadelphia Academy No. 3219), which, as stated by Noble [52] in 1924, is little more than a few fragments of skin and loose bones. Thus the nature of the pupil in the type is unascertainable, the fingers and toes are missing, and all the information that one can glean is that the length of the tibial bone is exactly 9.5 mm. and the femur 8 mm.

In 1882 Boulenger united *H. fulvovittatus* with *H. vittiger* under the name of *Rappia fulvovittata* but later (1911), apparently discovering a vertical pupil in a Uganda specimen, he revived the name *vittiger* but placed it in the genus *Megalixalus*.

In 1913 Boettger, when reporting on Voeltzkow's Zanzibar collection, referred certain frogs (part of the series now M. C. Z. 10196–7) from Mkokotoni to *fulvovittata*. In 1920 Miss Procter also referred 30 specimens which I collected at Morogoro and Duthumi, Tanganyika Territory, to *Rappia fulvovittata*. Following suit and using this material for comparison I have confidently referred East African material to *Hyperolius fulvovittatus* Cope ever since.

Quite recently, however, some topotypic Liberian material (M. C. Z. 12024–6) was received by the Museum of Comparative Zoölogy and an examination shows that while the general pattern is similar the Liberian frog is a *Megalixalus* with a strong color pattern and the East African form has only a very faint pattern and structural differences which are described below.

From the descriptions of Cope and Peters it seems obvious that Boulenger was correct in 1882 when he placed *vittiger* in the synonymy of *fulvovittatus* but both should have been referred to *Megalixalus* and not to *Rappia*.

Of the seven frogs in the National Museum collection listed above three have the eyes so poorly preserved that it is impossible to say whether the pupil is vertical or not; in one (24318) it is round, in two (24316–7) roundish but laterally compressed; in only one (24183) is it definitely vertical.

Mr. H. W. Parker has been to considerable trouble in assisting me to thrash out the problem of the relationships of the western and eastern frogs and has made careful comparison of the material in the British Museum. Under date of April 3 he writes:

> The following eight batches of specimens are all very well preserved and all show a vertical pupil and are consequently *Megalixalus* * * * Boulenger

[52] Noble, 1924, Bull. Amer. Mus. Nat. Hist., vol. 49, p. 255, footnote.

called them all *M. vittiger*. In all of these the pattern is quite well defined, but the color is not always black, nor even chocolate; sometimes it is quite a light brown.

Two Kribi, Cameroons.
Four Bitye, Cameroons.
Two Efulen, Cameroons.
Seven Zima County, Cameroons.
Two Shari River, Cameroons (7 N. by 16 E.).
Six Cazamena, Senegal.
Two Buddu Coast, Lake Victoria, Uganda.
Two Entebbe, Uganda.

The following specimens are all badly preserved. In not a single specimen is it possible to say with certainty what the shape of the pupil was.

One Duque de Bragance, Angola.
Five Yala River., K. C.
Six Nyika Plateau, Nyasaland.
Two Morogoro, Tanganyika Territory.
Three Duthumi, Tanganyika Territory.

In the first two batches the color pattern is well defined and is similar to that of the *M. vittiger*. Only one of the Morogoro specimens shows any color pattern. The Duthumi specimens lack all trace of color pattern. The Nyasaland frogs are too ill preserved for one to be able to make any deductions from them.

Subsequently I was loaned the Yala River specimen. It is certainly *fulvovittatus* of the West African type with distinct and vivid markings. The Morogoro males are just as certainly of the East African type and there is no difficulty in distinguishing them.

I very much doubt if *M. fulvovittatus typica* occurs in East Africa east of the great lakes, except in the vicinity of Mount Elgon.

The East African form which everyone has called *fulvovittatus* hitherto I identify with ——.

#### MEGALIXALUS BRACHYNEMIS Boulenger

*Megalixalus brachynemis* Boulenger, 1896, Ann. Mag. Nat. Hist., ser. 6, vol. 17, p. 403, pl. 17, fig. 2. (Chiradzulu, Nyasaland.)

*Rappia fulvovittata* Boettger (not of Cope), 1913, in Voeltzkow, Reise in Ostafrika, vol. 3, p. 346. (Zanzibar).—Procter, 1920, Proc. Zool. Soc. London, p. 417. (Morogoro and Duthumi, T. T.)

*Hyperolius fulvovittatus* Barbour and Loveridge (not of Cope), 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 224. (Dar es Salaam and localities in the Uluguru and Usambara Mtns., T. T.)

2 (U.S.N.M. 76864–5) Kizerui, Usambara Mtns., T. T. (Loveridge) 1926.

Owing to the short and misleading description (and figure as relating to the webbing of the toes) it seems advisable to redescribe the species. Before doing so specimens were submitted to Mr. H. W. Parker of the British Museum, for favor of comparison with the type; he confirms my identification. Redescribed from an adult female, No. 13336, Museum of Comparative Zoölogy, from Nyange, Uluguru Mountains, Tanganyika Territory; collected by Arthur Loveridge, October 1, 1926.

*Material.*—Two specimens in the National Museum as listed above; also specimens in the Museum of Comparative Zoölogy from the following localities in Tanganyika Territory—namely, Duthumi (Nos. 9524–5), Morogoro (Nos. 9528–9), Nyange (No. 13337), Tawa (Nos. 13338–46), Dar es Salaam (Nos. 13347–56), Kizerui (Nos. 13357–60)—and 11 unregistered specimens, one of which has been sent to the British Museum. Also from Mkokotoni, Zanzibar (Nos. 10196–7), the last two being collected by A. Voeltzkow.

*Diagnosis.*—This species differs from *M. fulvovittatus* with which it has hitherto been confused in the following points:

1. Smaller size demonstrable as follows:
Range in length from snout to vent of 9 topotypic **fulvovittatus** 23–27 mm.
Average length from snout to vent of 9 topotypic **fulvovittatus** 25.5 mm.
Range in length from snout to vent of 41 **brachynemis** 18–25 mm.
Average length from snout to vent of 41 **brachynemis** 20.6 mm.
2. Proportionately smaller tibiae as shown by the following:
Length of tibia is contained in total length of **fulvovittatus** 2.07 to 2.26 times.
Average of tibia contained in total length of **fulvovittatus** 2.15 times.
Length of tibia is contained in total length of **brachynemis** 2.29 to 2.63 times.
Average of tibia contained in total length of **brachynemis** 2.42 times.
3. Shorter fingers and toes of **brachynemis**; this could doubtless be demonstrated by delicate measurements were one so disposed to expend the time.
4. Snout shorter and blunter.
5. More slender habit, the body being but rarely broader than the head.
6. Faintly defined, or altogether absent, dorsal stripes.

I was of the opinion that the third and fifth toes were more strongly webbed in *brachynemis*, but Parker informs me that they can be matched among West African *fulvovittatus*.

*Description.*—Head as broad as long; snout bluntly rounded, slightly projecting, longer than the orbital diameter (measuring the snout as from the anterior border of the eye); canthus rostralis rounded and indistinct; loreal region sloping, not concave; interorbital space almost equals the upper eyelid; the transverse orbital diameter about equals the distance from the anterior border of the eye to the nostril; tympanum hidden. Fingers and toes short, dilated at their tips, fingers not webbed, or with an indistinct trace of webbing; toes strongly webbed to the first joint of the first toe and the outer aspect of the second to halfway between the first joint and the disk on the inner aspect of the second, to the second joint on one side of the third and to the disk on its other aspect, to the third joint (thence sometimes as a narrow margin to the disk) on both sides of the fourth, to the disk of the fifth; the tibio-tarsal articulation of the adpressed hind limb reaches to a point between the base of the fore limb and the eye (this is also the case with 34 of the specimens, but in 4 Dar es Salaam frogs, 1 of which is a female, and in 1 Zanzibar specimen it just reaches the eye).

Skin smooth above and below except at the angles of the jaw, the posterior part of the belly, and the lower and hinder aspects of the thighs where it is granular.

*Color in alcohol.*—Above buffy white, minutely dotted with brown on all upper surfaces; a concentration of these dots form four longitudinal lines; two of these are dorsal and proceed from above the anus to a point where they converge between the eyes; on either flank is another line which, commencing on the snout, passes through the eye and fades out two-thirds of the way along the flank.

*Color in life.*—The satiny greenish-yellow and silvery white coloring of this species, with its variations, has been published recently.[53]

*Measurements.*—Snout to vent, 26 mm.; length of head, 8.5 mm.; length of snout, 4 mm.; breadth of head, 8.5 mm.; diameter of orbit, 2.5 mm.; length of tibia, 10 mm.; length of foot, 15 mm.; and length of fourth toe, 7 mm.

This is the largest female known; the average of 35 was 20 mm.; males attain a length of 22 mm. Note the shortness of the tibia, which in a *Megalixalus fulvovittatus* of 27 mm. is 13 mm.; the fourth toe in the same frog measures 10 mm.

### Genus HYPEROLIUS Rapp

Until a thorough revision of this genus has been carried out by some one to whom all the material is available, errors in taxonomy are almost certain to be perpetuated and perpetrated. The identifications given below must therefore be considered more or less tentative; in the case of *H. marmoratus* in particular it is difficult to believe that all the strikingly different color forms at present grouped under that name represent a single species. There seem, however, to be no definite structural characters whereby they may be separated.

#### HYPEROLIUS MARMORATUS Rapp

*Hyperolius marmoratus* Rapp, 1842, Arch. Naturg., vol. 8, pt. 1, p. 289, pl. 6, figs. 1 and 2. (Natal.)

*Rappia marmorata* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 121. (part).

1 (U.S.N.M. 22097) Jombéni Range, K. C. (Chanler) 1892.
5 (U.S.N.M. 40888–92) Juja Farm, K. C. (Sm. Afr. Exped.) 1909.
110 (U.S.N.M. 40913, 41704, 41807–905, 41964–8, 41986–99) Lake Naivasha, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41153) Mt. Kenya to Fort Hall, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 41687) Southern Guaso Nyiro, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41980, 42488) Nairobi, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49403) No locality, Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 49320) Mt. Sagalla, K. C. (Heller) 1911.

[53] See Barbour and Loveridge, 1928, p. 224.

1 (U.S.N.M. 57522) Uganda. (Hurter) N. D.
5 (U.S.N.M. 63369–72, 63535) Elizabethville, B. C. (Raven), 1919–20.
1 (U.S.N.M. 63393) Albertville, B. C. (Raven) 1919–20.
1 (U.S.N.M. 63489) Victoria Nyanza. (Raven) 1919–20.

Taking the series collected by the Smithsonian Expedition of 1909, first it may be said that they agree in having the outer fingers one-half webbed; every toe is webbed to the disk on one side, though in the case of the fourth it would be better described as being webbed to the base of the last phalanx; actually it is continued as a narrow margin to the base of the disk, though this fact can only be ascertained in well-preserved specimens. While the skin of the majority is smooth, three frogs (Nos. 40891, 40913, 41687) have warty backs.

The color is divisible into five types.

1. Practically pure white, unspotted. (Juja Farm; Naivasha.)

2. White or ashy-white, with minute but well-defined black dots. (Jombéni; Juja; Naivasha; Nairobi.)

3. Grayish to deep blue-gray, this resulting from the black dots being so numerous and close together. (Naivasha; Nairobi.)

4. Buffy brown. (Naivasha.)

5. Two of the warty frogs (Nos. 40913, 41687) mentioned above are a grayish color, but the flanks and limbs are vermiculated with black like the plate of Peter's *H. marginatus*,[54] a species which Boulenger relegated to the synonymy of *marmoratus* in 1882.

Many of these Nairobi and Naivasha frogs have been compared with the specimens from Nairobi reported on by Miss Procter and with which they are obviously specifically identical.

In length these Smithsonian Expedition specimens range from 15.5 mm. (an example with a rudimentary tail) to 30 mm. (female).

Taking the remaining specimens listed from five localities, it may be remarked that the transverse orbital diameter is, in every instance, a trifle longer than the distance between the anterior border of the orbit and the eye. In No. 57522 the outline of the tympana are faintly visible in a good light. In No. 63535, a very fat female, the tibio-tarsal articulation just falls short of the eye. Apart from these variations all agree with the revised description of the species given by Boulenger in 1882. It might be added that the outer finger is webbed half its length, and the outermost toe actually to the disk.

The larger size (35 mm.) of the Albertville and Victoria Nyanza frogs leads me to imagine that they represent a distinct species, but the latter is too dried to be of much use, though its colors are vivid. The chief color variations are:

1. No. 49320 answers remarkably well to Günther's description of the coloration of *H. flavomaculatus* from Rovuma Bay. Boulenger later referred the type to *Megalixalus* and Mr. H. W. Parker has very

[54] Peters, 1882, Reise nach Mosamb., vol. 3, pl. 22, fig. 8.

kindly compared the Sagalla frog with the type and finds them generically distinct. He also says that there are examples of *H. marmoratus* from Beira in the British Museum with which the Sagalla frog is comparable as to coloring. (Mount Sagalla).

2. Three prominent white (black-edged) longitudinal bands; the vertebral from nostrils to anus; the lateral from the posterior supra-ocular regions to the flanks; the broader bands between are chocolate color; limbs white except for numerous chocolate-colored blotches or streaks (Albertville) or limbs yellowish with minute brown speckling (Nyanza).

3. Nos. 63369–72 are slaty-black above with three streaks, as in 2, but very narrow; consequently, the intermediate areas are broader, and instead of being immaculate are spotted or steaked or broken up posteriorly. In No. 63535 this tendency results in the whole upper surface of the body and limbs being vermiculated white and black. All agree in having conspicuous, irregular, white-edged, black spots on the throat, while the throats of the Albertville and Nyanza frogs are immaculate. (Elizabethville.)

4. No. 57522 represents a further stage in which the vermiculations of the upper surface having become interrupted they have formed irregular shaped blotches. The throat is spotted like those of the Elizabethville frogs, though less distinctly. It has been labeled *H. viridiflavus*, but the webbing of the toes precludes the idea of its being referable to that species. (Uganda.)

#### HYPEROLIUS SYMETRICUS (Mocquard)

*Rappia symetrica* Mocquard, 1902, Bull. Mus. Hist. Nat., vol. 8, p. 408. (Athi River, Kenya Colony.)

2 (U.S.N.M. 41094–5) West side Mt. Kenya, K. C. (Sm. Afr. Exped.) 1909.
2 (U.S.N.M. 41297, 42995) Wambugu, K. C. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 42045) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 43093) Nairobi, K. C. (Sm. Afr. Exped.) 1909.

The diameter of the orbit is equal to or rather greater than the distance between the anterior border of the eye and the nostril; a translation of the original description would read "snout short, equal to the horizontal diameter of the eye". Apart from this these frogs agree precisely with the structural description of the holotype of *symetricus*. The few tubercles, which Mocquard suggested were of little significance, are present or almost absent; they reach their maximum development in the Wambugu frog.

In coloration the first four listed above are apparently brown, like the type; the last two are buffy gray and indistinguishable from *marmoratus* of the same shade except that one has the T-shaped interocular marking of the type as have also two others, it appears to be lacking in the two smaller specimens, but may be obscured by the rust with which they are stained.

Five of the series are males, ranging in length from 24 to 30 mm.; they apparently attain a larger size than the males of *marmoratus* inhabiting the same regions; though apparently closely related the males of *symetricus* may be distinguished at once by their very large and granular gular disks, those of the males of *marmoratus* being smooth or at most only very faintly granular. It may be that some females of *symetricus* are included in the *marmoratus* series as the female is unknown. One young frog measures 20 mm.

#### HYPEROLIUS CINCTIVENTRIS Cope

*Hyperolius cinctiventris* Cope, 1862, Proc. Acad. Nat. Sci. Phila., p. 342. (Umvoti, Natal).—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 737. (Tana River, Kenya Colony.)

*Rappia cinctiventris* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 126.

1 (U.S.N.M. 20493) Tana River, K. C. (Chanler) 1892.

Doctor Stejneger has discussed this specimen at considerable length and there seems to be no reason for questioning the identification, especially in view of the fact that I have no topotypic material with which to compare it, and Doctor Stone informs me that the monotype can not be found in the Philadelphia Academy. I might add the following to the description given by Stejneger. The inner toe is webbed just beyond the terminal joint; second toe to terminal joint on one side and nearly to the disk on the other; the fourth toe to the subterminal joint on both sides; the fifth toe to the disk.

#### CHIROMANTIS PETERSII Boulenger

*Chiromantis petersii* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 93, pl. 10, fig. 1 and 1*a*. (Interior of East Africa, 1 example.).—Nieden, 1915, Mitt. Zool. Mus. Berlin, vol. 7, p. 366. (Pokomonie, Taita, Ikoma.)

*Chiromantis macrops* Ahl, 1929, Zool. Anz., vol. 80, p. 29. (Ganda Ali, Annia Galla, Arussi Galla, 4 ex.; 75–79 mm., 1 ex., 19 mm.)

*Chiromantis albescens* Ahl, 1929, Zool. Anz., vol. 80, p. 30. (Pokomonie, Kenya Colony. Type 35 mm., 2 ex.).

*Chiromantis fasciatus* Ahl, 1929, Zool. Anz., vol. 80, p. 31. (Taita, Kenya Colony; Ikoma, Tanganyika Territory. Type 55 mm., 2 ex.).

4 (U.S.N.M. 72432–5) Dodoma, Dodoma, Tanganyika Territory. (Loveridge.)
1 (M.C.Z. 9515) ? Morogoro, Tanganyika Territory. (Loveridge.)
1 (M.C.Z. 10375) Gwao's, Singida, Tanganyika Territory. (Loveridge.)
1 (M.C.Z. 10376) Nyambita, Mwanza, Tanganyika Territory. (Loveridge.)
2 (M.C.Z. 12173–4) Dodoma, Dodoma, Tanganyika Territory. (Loveridge.)
1 (M.C.Z. 12175) Mukwese, near Manyoni, Tanganyika Territory. (Loveridge.)

When listing the material of the genus *Chiromantis* in the Berlin Museum recently Doctor Ahl has described four additional species of the genus. Apparently misled by the rather inaccurate figure of

the digital disks of the type he has reversed Nieden's identifications of *C. petersii* and utilized the material as types for two new species and lists that there are no examples of *C. petersii* in the Berlin Museum.

The position is best seen by reproducing that portion of Ahl's key which purports to separate the alleged species.

D 1. Disks very small ..... petersii.
D 2. Disks rather large, or large, at least half as big as the tympanum ...
E 1. Outer finger one-third webbed ..... macrops.
E 2. Outer finger with only a rudiment of web at the base .....
F 1. Tibia contained twice in the body length ..... albescens.
F 2. Tibia two and a half times in the head and body length .....
G 1. First finger scarcely smaller than the second; no tarsal fold ..... fasciatus.

Boulenger certainly stated "disks very small" for *petersii*[55] and so they are when compared with those of many arboreal frogs and even other members of the genus *Chiromantis*. In the above series they are about half the size of their respective tympana; it appears that the younger the frog the greater the area of the tympanum covered by its digital disk, though doubtless some variation occurs, for in No. 10376 those on the left are two-thirds the diameter of the tympanum, while those on the right are only half the diameter of the right tympanum. No. 9515, which was named for me at the British Museum as *petersii*, does not differ from the others in the size of its disks. The distinction between D 1 and D 2 of the key is an imaginary one, based on the statement "disks very small" and the figure of the type.

One of the Dodoma frogs (No. 12175), which is the largest example (65 mm.) which I have taken, might well be said to have its outer fingers one-third webbed (that is, is *macrops* of the key); the rest are undoubtedly less than one-third webbed.

In the Singida frog (No. 10375) the tibia is contained twice in the length from snout to vent (that is, is referable to *albescens*), while in a Mwanza frog (No. 10376) it is two and a half times and would together with the Mukwese specimen (No. 12175), which agrees with it in lacking a tarsal fold (as do all the series), have to be referred to *fasciatus*. The variation in the tibial length of the series is as follows:

| M. C. Z. No. | Total length | Tibia contained in length from snout to vent | M. C. Z. No. | Total length | Tibia contained in length from snout to vent |
|---|---|---|---|---|---|
| | *Mm.* | *Times* | | *Mm.* | *Times* |
| 10375 | 38 | 2.00 | 12174 | 65 | 2.24 |
| 9515 | 48 | 2.18 | 10376 | 45 | 2.50 |
| 12175 | 30 | 2.21 | 12175 | 33 | 2.53 |

[55] In this connection Mr. H. W. Parker writes me (May 25, 1929): "As you suspected the disks of the type are shriveled; I softened those of one hand in KOH and then spread them with needles under the binocular. The transverse diameter of the disk of the third finger measured about 5.5 divisions of my micrometer scale (10 divisions approximately equals 3 mm.) and the tympanum of the same specimen measured 9 divisions of the same scale. For comparison the same figures fora larger frog from Dodoma were 8 and 12 mm.

The measurements of the various types are significant and I imagine that an examination of the vomerine teeth of the young *macrops* would show them to be rounded as in *albescens* and not in oblique rows as in the adults of *macrops*. In the series of the Museum of Comparative Zoölogy the development of these teeth is well shown.

The other differences contained in the lengthy descriptions are too obviously trifling variations to warrant detailed discussion.

#### LEPTOPELIS BOCAGII (Günther)

*Cystignathus bocagii* GÜNTHER, 1864, Proc. Zool. Soc. London, p. 481, pl. 33, fig. 2. (Duque de Bragança, Angola.)

*Hylambates bocagii* BOULENGER, 1882, Cat. Batr. Sal. Brit. Mus., p. 133, figs. (West Africa.)

*Leptopelis nanus* AHL, 1924, Arch. für Naturg., p. 252. (Margu, Togoland.)

*Leptopelis anchietae* NOBLE (not necessarily of Bocage), 1924, Bull. Amer. Mus. Nat. Hist., vol. 49, p. 234. (Belgian Congo localities.)

*Leptopelis bocagii* LOVERIDGE, 1925, Proc. Zool. Soc. London, p. 787. (Sagayo, Mwanza, Tanganyika Territory.)

*Hylambates viridis* GÜNTHER, cited by Angel, 1925, Reptiles et Batraciens in Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–12) p. 54. (Kisumu, Kenya Colony.)

1 (U.S.N.M. 40932) Ulukenya Hills, K. C. (Sm. Afr. Exped.) 1909.

In all respects a typical male, it measures 49 mm. The tibiotarsal articulation of an adpressed hind limb reaches the tympanum which is quite distinct. The very distended stomach holds two solpugids.

Ahl has described from Togoland a young (22 mm.) frog which he states is "related to *L. bocagii* and *L. verrucosus* from both of which it differs in (1) longer tongue, (2) broader interorbital space, (3) somewhat longer hind limb" (translation). The material in the Museum of Comparative Zoölogy exhibits the following variations:

| Museum No. | Tongue into body length | Interorbital space in relation to eyelid | Tibiotarsal articulation of hind limb reaches the— |
|---|---|---|---|
| | *Times* | | |
| 3484 | 3.75 | Broader | Tympanum. |
| 6614 | 4.75 | do | Eye. |
| 9517 | 3.50 | do | Do. |
| 9518 | 3.50 | do | Tympanum. |
| 10440 | 4.25 | As broad | Eye. |

The localities from whence these specimens came are Guaso Nyiro district, Kenya Colony; Faradje, Belgian Congo; Nairobi, Kenya Colony; Sagayo, Mwanza, Tanganyika Territory.

Noble has already foreshadowed the probability of *L. anchietae* (Bocage) having to be united with *L. bocagii* and I entirely agree with his remarks.[56] His material, however, was undoubtedly identical with Nairobi specimens identified for me by Miss Procter; one of his Faradje frogs is now M.C.Z. No. 6614 referred to above. The

[56] Noble, Bull. Amer. Mus. Nat. Hist., vol. 49, 1924, p. 235.

Nairobi frogs, being juvenile, lack the brown dorsal patch which is present in the Ulukenya, Guaso Nyiro, Sagayo, and Faradje specimens. Having no topotypic Angolan *L. anchietae* its specific distinction from L. *bocagii* must be left an open question for the present.

Through the courtesy of Monsieur Angel I have been able to examine the 40 mm. frog (P. M. 04–360) which he recently recorded under the name of *H. viridis*, a species which Boulenger referred to the synonymy of *H. bocagii* in 1906. Structurally, this frog agrees perfectly with the 42 mm. example from Sagayo, a little to the south of Kisumu; the throats of both are granular and the amount of rudimentary webbing between the toes is the same.

#### LEPTOPELIS ULUGURUENSIS Barbour and Loveridge

*Leptopelis uluguruensis* Barbour and Loveridge, 1928, Mem. Mus. Comp. Zoöl., vol. 50, p. 235, pl. 3, fig. 3. (Nyange and Vituri, Uluguru Mountains, Tanganyika Territory.)

1 (U.S.N.M. 57726) Ukami, T. T. (Hurter) N. D.

This 43 mm., practically topotypic, specimen has been compared with the type with which it agrees, even to the irregular spotting of the back, the orange fading to white on preservation. It was labeled *L. rufus*, a species with which it has long been confused though in reality it is much more closely related to *L. aubryi* from which it can be distinguished by the half-webbed outer fingers which in *aubryi* are but a third webbed.

## Family BREVICIPITIDAE

### Genus PHRYNOMERUS Noble

#### PHRYNOMERUS BIFASCIATUS (Smith)

*Brachymerus bifasciatus* Smith, 1849, Illustr. Zool. S. Africa, vol. 3, pl. 63. (Country to the east and northeast of Cape Colony.)

*Phrynomantis bifasciata* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 172.—Stejneger, 1893, Proc. U. S. Nat. Mus., vol. 16, p. 737.

*Phrynomerus bifasciatus* Noble, 1926, Amer. Mus. Novit., 212, p. 20.

3 (U.S.N.M. 20113–5) Tana River, K. C. (Chanler) 1892.
1 (U.S.N.M. 22096) Jombéni Range, K. C. (Chanler) 1892.

The largest example (No. 22096) of this widely distributed species in the above series measures 48 mm. The variations of these specimens have already been dealt with by Stejneger in the citation given.

#### HEMISUS MARMORATUS (Peters)

*Engystoma marmoratum* Peters, 1855, Arch. Naturg., vol. 21, pt. 1, p. 58. (Cabaceira, Portuguese East Africa.)

*Hemisus marmoratum* Boulenger, 1910, Ann. S. African Mus., vol. 5, p. 535.—Noble, 1924, Bull. Amer. Mus. Nat. Hist., vol. 49, p. 279.

2 (U.S.N.M. 40755, 42035) Kenya Colony. (Sm. Afr. Exped.) 1909.
1 (U.S.N.M. 43092) Nairobi, K. C. (Sm. Afr. Exped.) 1909.

The largest (No. 40755) of these three narrow-mouthed frogs measures 52 mm. from snout to vent. No. 43092 has a darkly pigmented throat which Noble has stated is characteristic of breeding males.

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